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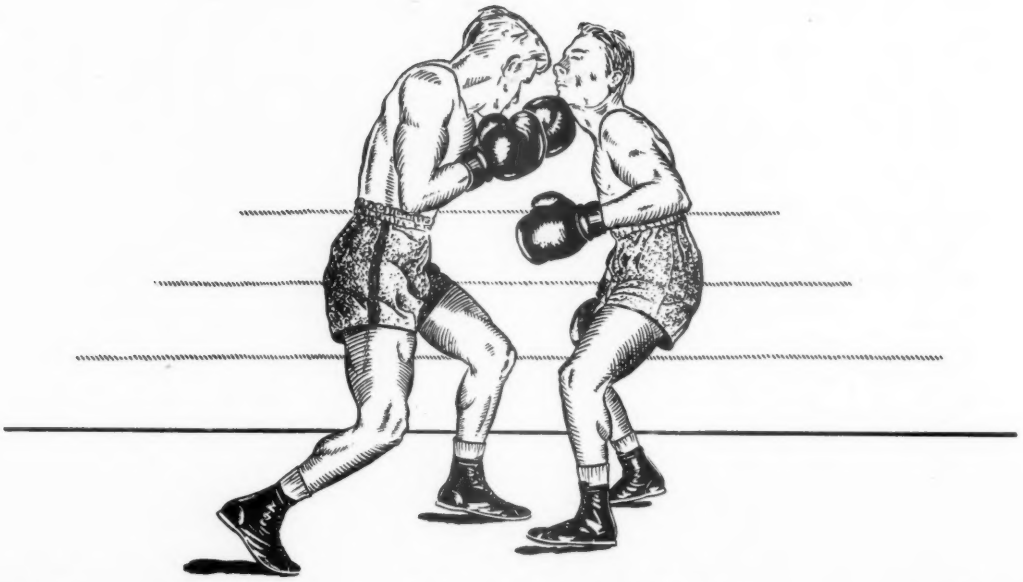

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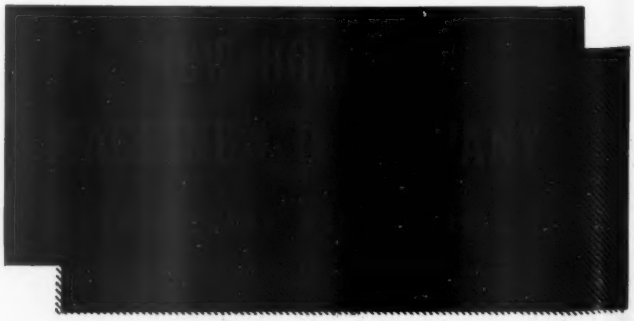

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PIT AND QUARRY

September, 1946

Vol. 39 No. 3

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EDITORIAL

Let's Win the Safety War at Home

THE accident statistics for the year 1945, recently released by the National Safety Council, should receive the close attention of everyone in the nonmetallic minerals industries, from the highest executives to the workers in the plants. These figures show that accidents rank fourth as a cause of death in this country, being exceeded only by heart disease, cancer and cerebral hemorrhage. Among males accidents rank third, being exceeded only by heart disease and cancer. Deaths from accidents far exceeded those from pneumonia and tuberculosis. In 1945 over 96,000 human beings were killed in accidents, most of which could have been avoided.

Another startling comparison is made by the Council in comparing accident figures with World War II casualties from Pearl Harbor up to V-J Day. In that period of less than four years, war casualties totalled 261,608 killed, 651,911 wounded, and 32,811 missing. During this same period our accident toll was 355,000 deaths and 36,000,000 injuries. Aside from the vast amount of human suffering caused by these accidents, the loss of output of vital war material and the financial loss to industry were incalculable.

Drastic measures have been taken to protect everyone from disease, with the result that deaths have dropped materially for most types of disease and serious epidemics seldom occur. Drastic measures have also been taken to reduce both the number of accidents and their severity, but unfortunately these efforts are reaching at present only a comparatively small percentage of the population.

Outstanding in this field has been the work of the National Safety Council, a non-profit co-operative organization devoted solely to the promotion of safety and safety methods. Financed through membership dues and public subscription, the Council provides services to meet the needs of industrial concerns, insurance companies, associations, of traffic, home, and farm safety organizations, of government departments, schools, libraries, and individuals. The Council is constantly gathering and distributing information about the causes and best methods of prevention of all classes of accidents. This information is presented in various ways, ranging from a graphic poster portraying one important accident problem to an elaborate plan for the analysis of causes and the prevention of accidents in an industry, a state, or a city. Notable also has been the work done by the U. S. Bureau of Mines, the Portland Cement Association, the National Crushed Stone Association, the National Sand and Gravel Association, the National Lime Association, and others.

The Council (or any similar agency) can, however, concentrate direct safety efforts only through schools and member organizations, thus reaching for intensive training only a small percentage of the population. Most of the others can be reached only by indirect means such as newspapers and magazines, radio, movies, etc. Such publicity is helpful, but it cannot take the place of proper safety education such as is provided the employees of member companies. As a result safety organizations have drastically reduced accidents in the industries and companies where direct contact has been established, but have succeeded to a lesser degree in reducing accidents generally. As proper and effective safety training and education can only be achieved by direct instruction, further substantial decreases in accidents can only be obtained by getting more companies to take a direct interest in the subject, to train their employees, and to take every precaution to remove hazards from their work.

It is true that only a small percentage of accidents, fatal or otherwise, can properly be called occupational. Only about 16,000 of the 96,000 fatal accidents in 1945 came in this category, compared to 33,500 in the home, 28,600 in the motor vehicle, and 15,500 in the public non-motor vehicle categories. However, most of the non-industrial accidents happened either to the nearly 60 million workers or to members of their families. Actually 45,000 workers were killed in accidents during 1945, but 29,000 or 64 per cent. of these were killed in non-occupational accidents—in the homes, on the streets and highways, or in other public places.

It becomes apparent that the worker is the approach to this problem and that only through him can the general public be effectively taught to think and act safety. Only by teaching him safe thinking and action can the general public be impressed with the necessity for safe thinking and safe acting in the home, on the highway, and in public places.

It is, in our opinion, the duty of every company to undertake the training of its employees in safety and to provide safe places for them to work, whether this is done independently, through the National Safety Council, or in some other way.

STATISTICS prove that industries which have taken adequate steps toward safety have profited materially in lives saved, and more directly in savings of lost time. The nonmetallic minerals industries in general, which are by their very nature among the most hazardous, rank among the highest in accident frequency and severity. Those nonmetallic industries, however, which have long actively promoted safety through plant safety programs and industry-wide safety contests have among the lowest accident frequency rates of any industries. Notable among these are the cement and quarry industries. That these records were achieved against heavy odds is evident from the fact that the accident severity rates of these industries are relatively much higher—being considerably above the average for all industries.

Every industrial accident is the result of an unsafe work place, an unsafe act, or both. Management can reduce the physical hazards existing in most plants by eliminating dangerous equipment and providing suitable guards, efficient exhaust systems and other vital safety provisions.

Management can further reduce accidents by providing adequate safety training and instruction for employees. This will reduce accidents not only on the job but elsewhere as well, as a safety-minded worker is a safe driver, pedestrian, spectator, etc. He is also an ambassador of safety in his own family and in his other contacts.

The need for safety training is now accentuated by the return to peacetime industry of thousands of war workers, many of whom are unfamiliar with its equipment and processes. Also re-entering industry are hundreds of thousands of ex-service men. Many of these are young men, even boys, who have never worked before and are unfamiliar with the hazards found in industrial plants. These young men are especially in need of safety training as a large percentage of them are in the age classification which has the highest accident death rate. These men are, however, highly susceptible to adequate safety training through the discipline and obedience to constituted authority drilled into them in the armed forces.

New Construction Peak Reached by Eastern States During First Half of 1946

A new construction peak, as measured by the dollar volume of contracts awarded, was established in the 37 states east of the Rocky Mountains in the first half of this year, it was reported today by F. W. Dodge Corporation.

The total of contracts awarded in the Eastern states was $3,937,736,000, approximately a half billion greater than in the first half of 1928, the last previous peak year, a spokesman for the corporation said.

Residential volume contracts continued at a very high rate in June, although the total for the month was down from the phenomenal total of $463,600,000 established in the month of May. June's residential volume was $332,248,000.

Nonresidential construction contracts last month showed a recession from the May total of $290,963,000 to $273,207,000, indicating the effect of more stringent Federal controls on this class of construction.

The total of all construction contracts including heavy engineering works in the Eastern states reached $807,914,000 in June, as compared with $952,418,000 in May, the Dodge report showed.

Chilean Sulphur Industry Seeks New Post-War Markets

With the war over and Brazil and Argentina no longer consuming the entire output of the Chilean sulphur industry, Chilean producers are finding Texas and Louisiana producers offering keen competition in the sulphur markets. Minera del Pacifico and Aucanquilcha are the only two companies operating at present. Caja de Credito Minera is studying the problem of finding cheaper production methods.

Midwestern Operators Purchase Colorado Fluorspar Properties

Eastern users and Midwestern operators, anticipating exhaustion of Midwestern fluorspar resources, are continuing to purchase Colorado fluorspar mining properties which are either shut down or operating at reduced capacity as a result of the post-war slump in demand. A recent transaction was the purchase of the Wano fluorspar mill at Jamestown, Colo., by the Mahoning Mining Company, of Rosiclare, Ill., which is itself a subsidiary of the Youngstown Sheet & Tube Company. Production of from 800 to 1,000 tons per month of acid-grade fluorspar is contemplated. Harry M. Williamson and son, of Denver, who sold the mill, have retained their fluorspar mining properties and will furnish the ore for operation of the mill.

Coming Events

October 7, 1946—Chicago. 34th National Safety Congress and Exposition, Stevens Hotel.

October 16-19, 1946—Kansas City, Mo. Fall meeting, American Society of Civil Engineers.

October 23-24, 1946—Columbus, O. Industrial Minerals Division meeting, American Institute of Mining and Metallurgical Engineers, Deschler-Wallick Hotel.

October 24-25, 1946 — Chicago. Semi-annual meeting, National Industrial Sand Association, Edgewater Beach Hotel.

November 4-6, 1946 — Hershey, Pennsylvania. Fall meeting, Operating Division, National Lime Association, Hotel Hershey.

January 27-29, 1947—Chicago. 30th annual convention, National Crushed Stone Association, Edgewater Beach Hotel. (No exhibits.)

January 30-31, 1947—Chicago. Second annual convention, Agricultural Limestone Division, National Crushed Stone Association, Edgewater Beach Hotel, (No exhibits.)

February 16-20, 1947—New York. Annual meeting, American Institute of Mining and Metallurgical Engineers, Hotel Pennsylvania.

Nebraska Plants Approved By State Committee for Veterans' Training Project

Three Nebraska sand-and-gravel firms have been approved to provide on-the-job-training to veterans under the G. I. bill of rights, it was announced recently by the Veterans Service Coordinating Committee of Nebraska, of which Governor Dwight Griswold is chairman.

Included are the Christensen Sand & Gravel Company of Fremont, the Lux Sand & Gravel Company of North Bend, and the Western Lime Stone Products Company of Omaha. Previously approved to give on-the-job training were the Watkins Concrete Block Company, the Johns-Manville Corporation and the Micklin Company, all of Omaha, and the Eagle Insulation Company of Lincoln.

Michigan Cement Company Adds 2 New Rotary Kilns

Large-scale expansion plans now are being carried out at the Huron Portland Cement Company's plant in Alpena, Michigan. In October, 1945, the firm ordered two 10-foot by 153-foot, 6-inch Allis-Chalmers rotary kilns, the first order for such equipment placed with that company by a domestic concern since the beginning of World War II. Next, two Raymond bowl mills, two Fuller coolers and two Wickes waste heat boilers were ordered. The construction schedule calls for placing the kilns on the line in January, 1947, installations to be built for the addition of two more kilns later.

The raw grinding capacity of the plant is to be increased by the addition of one 7- by 26-foot compeb mill, operating in closed circuit, with a 14-foot separator; both of these have been ordered. Clinker grind capacity also will be enlarged by the installation of two Bradley Hercules mills which will discharge into three of the present tube mills, operating in closed circuit with air separators.

Coolers are to be installed on the six 10-foot kilns now in use. The first of these, ordered in the Fall of 1945, is to be installed immediately.

The Inland Steel Company has completed a new 450-foot shaft at the Guill fluorspar mine, near Salem, Ky. Exploratory work is under way at the company's Keystone mine in Kentucky.

Begin Major Improvements On Hawkeye Plant of Marquette Cement Co.

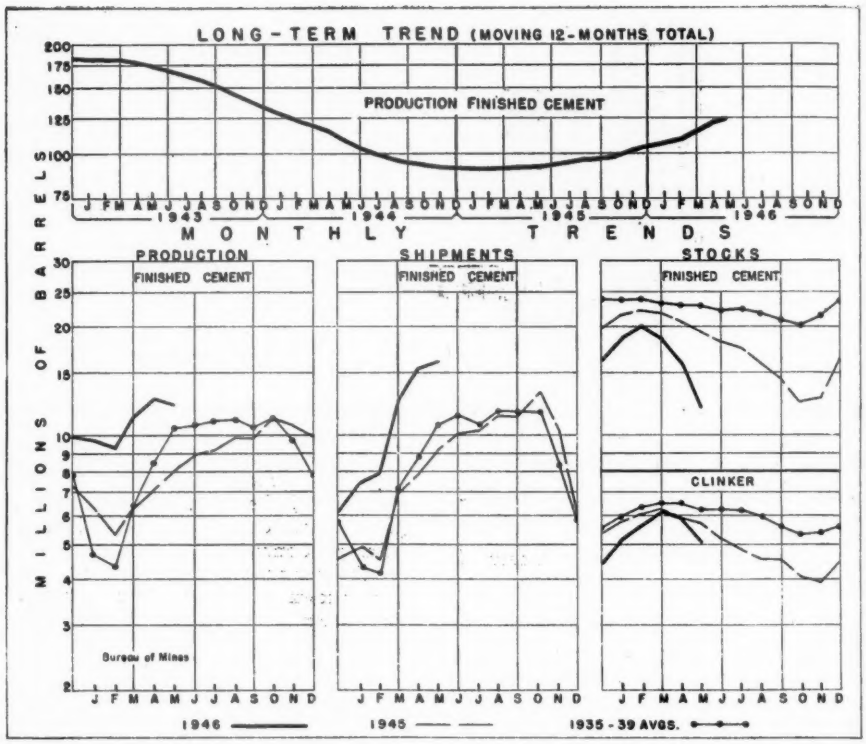
Marquette Cement Manufacturing Company recently announced that it was about to undertake its first major post-war plant reconstruction project in the modernization of the storage and shipping departments at its Hawkeye plant in Des Moines, Iowa. Funds have been appropriated for the construction there of new storage silos, packing and bulk loading plants and a sack-handling plant. All have been designed by Marquette's own engineering staff for greatly increased efficiency in handling the cement produced by the largest rotary kiln in the Western Hemisphere, which is now the feature of the Hawkeye plant. The new facilities will replace existing worn-out buildings, machinery and equipment.

Bids are now being taken on the sub-foundation and slab work for the new storage silos. By the middle of August contracts will also have been let for the construction of the silos proper, which will be of 216,000-barrel total capacity. These structures will replace obsolete flat storage facilities of similar capacity, which will be torn down. It is expected that this work will be completed this year to augment the existing 150,000-barrel silo storage capacity.

The other work is to be started early in 1947. This will include two new packing plants and one bulk loading plant, all complete with the latest type machinery and equipment. An innovation in the sack-handling department, also projected for that time, will be the use of pallets on which sacks can be moved about, stored and reclaimed by self-propelled carrying and stacking trucks. Also to be installed there are automatically-timed sack-cleaning devices, adapted from machinery conceived and perfected by Marquette personnel at the plant in Oglesby, Illinois.

More efficient systems of trackage, roadways, pipe lines, sewerage, water, fire and drain lines will also be installed at the Hawkeye plant under the current program.

This work is, in effect, the resumption of a modernization program for the Hawkeye plant which was begun just before World War II. The reconstruction now under way again will transfer an obsolescent setup into one of the most modern, efficient cement-shipping plants in the country, according to Marquette officials.



Production of 12,172,000 barrels of cement in May, 1946, reported to the United States Bureau of Mines, was 51 per cent. greater than that reported for May, 1945. Shipments of 16,083,000 barrels were 73 per cent. greater than those reported for the corresponding month of 1945. These figures indicate a continued strong recovery in both output and shipments. Mill stocks on May 31 were 24 per cent. lower than at the end of April, 1946, and 38 per cent. lower than a year ago. Clinker production of 11,456,000 barrels in May, 1946, was 43 per cent. above that reported for May, 1945. The industry operated at 59 per cent. of capacity in May, 1946, as compared with 40 per cent. a year earlier. Cumulative figures for the first five months of 1946 show a gain of 65 per cent. in production, 77 per cent. in shipments, and 66 per cent. in clinker production, as compared with the corresponding period of 1945. Demand for cement, as indicated by mill shipments, was higher than in May, 1945, in all districts. In nine districts and Hawaii shipments were more than double those of May, 1945. The long-term trend in production of finished cement is indicated in the accompanying chart. Trends in production, shipments, and stocks are also indicated graphically, as compared with the 1935-39 average.

Gas Taxes Called Adequate For Financing Highways

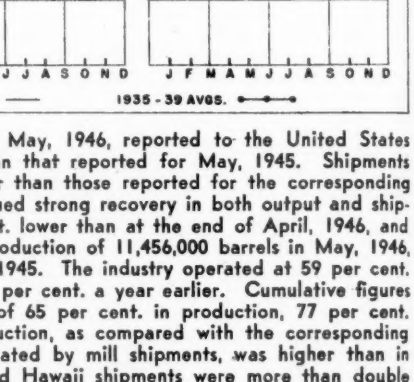
Citing "a steadily improving highway revenue situation, substantial highway fund balances, and the time leeway permitted under the federal-aid legislation," the American Petroleum Industries Committee predicts that "the states generally will have ample funds with which to finance their post-war highway projects within the present framework of taxation."

"Recent trends in state highway revenues indicates that the problem of carrying out highway improvements will not be one of insufficient funds," the A.P.I.C. says in its *Tax Economics Bulletin*. "The problem rather appears to be one of procuring adequate supplies of equipment, materials and manpower."

Citing Public Roads Administration data revealing that state gasoline tax receipts last year totaled $783,691,000, an increase of 15 per cent. over 1944 receipts of $680,950,000, the A.P.I.C. declares that "in many states at the present time, gasoline tax receipts are already running ahead of pre-war levels." Alabama, Arizona, Arkansas, California, Nebraska, South Carolina and Tennessee are among such states.

$150,000 Feldspar Mill Approved for Colorado

The Colorado Feldspar Company, a subsidiary of Consolidated Feldspar Corporation, of Trenton, N. J., has obtained priorities totaling $150,000 through the Civilian Production Administration in Denver for the building of a large feldspar processing mill at Parkdale, 12 miles west of Canon City, where the company owns extensive feldspar deposits.



According to data collected by the National Lime Association, 48 companies in May, 1946, shipped 150,748 tons of lime (85,887 quicklime; 64,861 hydrate). Reporting companies represent 43.7 per cent. of the association members' total capacity of record. Based on Pit and Quarry's estimates for the remainder of the industry, the total shipments for the month by all plants were approximately 405,000 tons. Shipments of lime by users for May, 1946, were:

Use	Quicklime (tons)	Hydrate (tons)
Agricultural	1,810	15,295
Building	11,601	22,783
Chemical	72,476	26,783
Total	85,887	64,861

Operating Div. of Lime Assn. Plans Meeting at Hershey, Pa., Nov. 4-6

Hershey, Pennsylvania, situated in the heart of the eastern Pennsylvania lime-producing area, was the place chosen for the fall meeting of the National Lime Association's Operating Division. The dates are November 4 to 6, and headquarters will be at the Hotel Hershey. The sessions will be devoted to free exchange of ideas among representatives of member companies.

Serving on the arrangement committee are Russell Rarey, Marble Cliff Quarries Company, Columbus, Ohio; Amos B. Miner, National Gypsum Company, Buffalo; and E. D. Williams and H. E. Millard, Annville, Pennsylvania. The program is being worked out by Wallace E. Wing, Marblehead Lime Company (chairman); B. L. Corson, G. & W. H. Corson, Inc., Plymouth Meeting, Pennsylvania; and F. A. Manske, National Gypsum Company, Buffalo.

Among the features planned for the meeting is an inspection trip to the Millard quarries and lime plant at Annville.

Illinois, Kentucky Lead In Fluorspar Shipments

A report of the U. S. Bureau of Mines shows that the Kentucky-Illinois fluorspar mines shipped 242,393 short tons in 1945 at a total value of $7,847,752. Fluorspar shipped from all mines in the United States last year totalled 323,961 tons. Ranking first and second among the states in fluorspar shipments were Illinois with 147,251 tons and Kentucky with 95,142 tons. Total shipments for 1945 showed a decline of 46,657 tons as compared with 1944 shipments.

Four States Report Progress In Road Building Projects

Kansas—Marking the initial step in a three-year improvement program expected to give Kansas one of the best secondary road systems in the nation, the Kansas State Highway Commission has approved road construction projects totaling $7,945,146 for farm-to-market travel.

Director of Highways D. J. Fair said work on a large part of the roadways will be well under way by the end of summer. The projects approved came from 99 of the state's 105 counties, and include 1,843 miles of grading, draining and surfacing. Sixty-seven new bridges, critically needed in many cases, also are part of the approved projects.

New Mexico — New Mexico's State Planning Board estimates that more than $350,000,000 worth of capital improvements are slated for construction in that state.

Data compiled by the board showed that projects under construction, ready for contract, in preliminary stages or contemplated, totaled $354,294,000, of which $100,278,000 was for projects ready for contract or under construction, another $249,753,000 in preparation, and $4,263,000 in preliminary stages. Projects making up the $100,278,000 figure included $41,507,000 already under construction.

Missouri—A bill authorizing use of money from the state's post-war general reserve fund for rural road construction was given final approval on June 26 by the Missouri legislature. Enactment of the bill marked the first time that the Missouri legislature has authorized use of general revenue funds for local roads.

While the bill itself appropriates no money for the purpose, the plan of the sponsors calls for expenditure of $10,000,000 in the next five years. The amount to be spent would be determined by future legislative appropriations.

Maryland — Governor Herbert R. O'Conor announced on June 30 that Maryland road construction costing $17,000,000, already under way or to be placed under contract before the end of the present construction year, will represent the largest amount of such work ever done at one time in the state's history.

Colorado Scoria Deposit Is Prepared for Production

A crushing plant has been installed at a scoria deposit on the Denver & Salt Lake Railway in western Colorado. This volcanic material and pumice, also a volcanic lava product, are coming into increasing use as constituents of cinder and concrete building block in the western states. Inspectors of the State Mines Department are looking for other deposits near shipping facilities.

The Milwhite Company, of Houston, Tex., has two Sullivan Machinery Company core drills doing test work on its barite property in Montgomery County, Ark. The company is reported to have three additional drills ordered for further explorations. Albert Hess, of Little Rock, is in charge of the work for the Milwhite Company.

National Safety Council Publishes Safety Pamphlet For Quarrying Industry

Safe quarrying practices to reduce the accident rate in the industry are outlined in *Safety in Quarry Operations*, a pamphlet published recently by the National Safety Council. It is a complete revision of a handbook published in 1943. The revision was handled by a special committee of the Cement and Quarry Section of the National Safety Council under the chairmanship of J. R. Boyd, administrative director of the National Crushed Stone Association.

Some of the principle subject headings of the pamphlet are:

Quarries and pits
Transportation
Electrical equipment
Explosives
Drilling
Loading, conveying and crushing equipment
Housekeeping and sanitation
Compressed air machinery and equipment
Safeguards for machinery and other plant installations
Hand tools
Welding
Fire prevention
Protective clothing and safety appliances
Safety education and training

The declared purpose of the pamphlet is ". . . to present a coordinated set of rules and regulations relating to the installation, use, maintenance and operation of safety devices, methods, and practices, the reasonable observance of which will promote safety. These requirements are intended to serve as a guide both for employer and employee. They are not intended to supersede legal requirements which stipulate higher or other standards, but should be supplementary thereto."

Prices and pamphlets may be obtained from the National Safety Council, Chicago 6, Ill.

The men in the above photo are members of the Half Century Club, which is composed of employees of the Nordberg Manufacturing Company who have 50 years of service or more. These four club members represent a total of 212 years of employment with the Nordberg company. Reading from left to right they are as follows: Hans Krogstad, assembly department, 54 years; E. C. Bayerlein, chairman of the Board of Directors and former vice-president and general manager, 52 years; L. C. Baumgarten, installation and service engineer, 54 years; and Charles Poller, traffic manager, 52 years.

Steam Turbine Operators Receive Allis-Chalmers Special Research Service

Steam turbine plant operators in the mining field are invited by the Allis-Chalmers Mfg. Co., Milwaukee, Wis., to participate in a cooperative study to increase their power plant efficiency through an analysis of the nature and cause of costly turbine blade deposits, the company has announced. The plan for gathering data from turbine units operating in the field is part of an expanded research project being conducted by the firm's water-conditioning and steam turbine departments.

The company is offering to analyze without charge or obligation steam turbine blade deposits from any make of turbine operating at throttle pressures of 350 pounds or higher, provided that the samples are taken in accordance with certain recommended procedures.

A summary of the results will be prepared and made available to those cooperating. No identification of the source of information will be revealed in the summary without specific permission. Requests for additional information should be addressed to Dr. L. A. Burkardt of the Allis-Chalmers research laboratory.

Miners' Safety Booklet Stresses Fire Prevention

Adequate ventilation, better installation and maintenance of underground electrical equipment, and the use of closed lights, permissible explosives only, and rock dust—all standard measures for preventing fires and explosions in bituminous coal mines—are re-emphasized in a new miners' circular released today by Dr. R. R. Sayers, Director of the Bureau of Mines.

The fourth in a series of accident-prevention textbooks for mine officials and others in charge of training programs at mines, the circular spells out in detail the factors responsible for mine fires and explosions, describes methods for preventing these disasters, and outlines topics for discussion in training classes. Safety engineers of the Bureau of Mines, many of whom have had years of experience in this type of accident prevention, joined in preparing this circular and others in the course.

Copies of *Miners' Circular 50* may be obtained at 25 cents each from the Superintendent of Documents, Government Printing Office, Washington 25, D. C.

Fluorspar Mining Properties Purchased by Pennsalt

The Pennsylvania Salt Manufacturing Company, of Philadelphia, Pa., recently announced the purchase of the Kentucky Babb Fluorspar mine near Salem, Ky. The mine and surface inventory were purchased from Roberts and Frazer who are active in other fluorspar mining operations. Pennsalt has completed underground explorations of the Kentucky Babb mine but is not producing from it as yet.

Pennsalt, one of the largest wartime producers of hydrofluoric and anhydrous hydrofluoric acid, also announced that it is making elemental fluorine available commercially for the first time. The element is sold only for experimental purposes at present.

When Ernest Winningham drove an 18-ton crane on to a bridge over Brush Creek near Divernon, Illinois, his mechanized mount took a plunge in the wrong direction—down into the creek—carrying the bridge with it. He had been driving the crane from the railroad station to the quarry of its owners, the Divernon Limestone Company. The bridge, condemned for the last 15 years, had done a one-hoss-shay collapse at last; but Winningham and the crane merely got a ducking.

National Lime Association Agricultural Fellowships Started in Five States

The National Lime Association has announced that on July 1 coordinating fellowships were started in Ohio, New Jersey, New York, Pennsylvania and Maryland. The second meeting of representatives from these states was held on July 10 and 11 at State College, Pennsylvania.

The representatives held their own discussions on the first day, and on the second they included lime manufacturers who are members of the National Lime Association agricultural research committee in the talks. The discussions covered the following aspects of liming: neutralization of acidity; supplying the plant foods calcium and magnesium; displacement of hydrogen; base exchange; effect on minor elements; effect on toxic compounds; effect on bacterial growth; effect on soil structure movement of liming material in the soil.

Packaged Safety Programs Available to Operators

The National Safety Council is preparing a series of safety-training package programs to help industrial members in conducting campaigns aimed at specific hazards. The following programs are available or in process:

Package Program No. 1—Plant Housekeeping
Package Program No. 2—Handling Materials
Package Program No. 3—Eye Protection
Package Program No. 4—Fire Prevention.

Council members in the nonmetallic industries who wish to make a well-organized attack on these problems may write to the National Safety Council, 20 North Wacker Drive, Chicago 6.

Kentucky Mine Properties Site of New Flotation Mill

Properties of the Senator and Meadows fluorspar mines in Kentucky were leased recently by the Mineral Flotation Corporation, headed by P. J. Bertelsen of New York, which began operation of a new flotation mill at Marion last November. Installation of a sink-and-float plant at the Caldwell site is planned. The mill, which handled reclaimed sand waste, was shut down in May by the coal shortage and freight embargo. According to Robert Swishes, plant superintendent, there are 1,000 tons of finished ore and 12,000 tons of crude ore on hand.

Modernization of the J. Miller Eshleman processed limestone plant at Landsville, Pennsylvania, now in progress, includes the addition of several pieces of new equipment. Already installed are three new Ransom mixers, Blaw Knox bins and a Model 3030 Holland crusher. A new transit-mix plant is being installed; and two 3-cubic-yard mixers have been ordered.

Production Costs Will Regulate Future Prices Of Two Cement Firms

The Marquette Cement Manufacturing Company and the Hawkeye Portland Cement Company have pledged themselves to keep their prices strictly in line with costs of manufacture and delivery, regardless of the future of government price control. Both companies state that while some further increase in the price of their commodity seems inevitable, in view of increased costs of labor, fuel and other items, "any increase by us will be held to the minimum needed to pay for added real costs — certainly no more than would have been produced by O.P.A. itself."

These affiliated companies point out that during the past two years, under O.P.A. ceilings, the wholesale price of their commodity rose a maximum of 10 per cent. over the pre-war figure. In the six-year period between August, 1939, and August, 1945, cement prices increased 8.9 per cent., well under the average of all building materials, which increased more than 30 per cent. in the same period, according to U. S. Department of Labor statistics.

The statement is also made by Marquette and Hawkeye that the O.P.A. had ready for release on July 2 an authorization to raise the price of cement five cents per barrel on all shipments in cloth or paper sacks, which increase neither company has yet put into effect, despite the death of the O.P.A. on June 30, and the fact that current package charges are below cost.

It is further stated that the O.P.A. had begun to study the need for another increase in cement prices to cover substantial rises in labor costs and other government-approved increases. "This study undoubtedly would have shown need for another 10 per cent. increase," it is claimed.

This message to the public was released by Marquette and Hawkeye in full page and quarter-page advertisements appearing in newspapers and trade magazines throughout the Middle West and South Central states.

Diesel-Powered Tug Used As Gravel Scow Pushers

A 60-foot tug powered by two 200-horsepower Super-Diesels has been purchased by the Construction Aggregate Corporation for use at its plant at Ferrysburg, near Grand Haven, Michigan. Here the new craft and three others will push huge gravel-loaded scows from the firm's beds at Bass River to the $2,000,000 plant.

The Diesel-powered tug was built and delivered by the Calumet Shipyard & Drydock Company of South Chicago, Illinois. It has an 18-foot beam and is 22 feet high. A tunnel stern supplies additional power, which enables the tug to give unusual performance.

Among other evidences of the firm's expanded operations is a completely modern office building east of the plant, equipped with a 30-ton scale. A current new development is a core sand project on the Sag in Grand River. The sand at present in great demand, is hauled to the plant by barges, processed and shipped out to foundries.

C.P.A. Enlists Industrialist To Aid Steel Scrap Drive

Plans to obtain the aid of industry in the government's recently announced iron and steel scrap salvage drive, which is aimed at bringing the country's steel furnaces up to capacity operations and increasing the flow of many peacetime products, were announced today by the Civilian Production Administration.

C.P.A. expects to enlist the services of most of the 860 industrial leaders who spearheaded the salvage drives during the war years and contributed so largely to their success. Plans call for these key industrialists to form active executive committees which will in turn blanket all industrial areas.

Ohio River Valley Producers Support Flood Wall Program

The Rosiclare Lead & Fluorspar Mining Company, The Aluminum Ore Company, the Inland Steel Company, and the Mahoning Mining Company, of Rosiclare, Illinois, are supporting a program for constructing a flood wall along the banks of the Ohio River in that city. A report on a survey made by the U. S. Engineers, operating out of the Louisville district, is favorable to the project, and has been submitted to the War Department. A. H. Cronk, superintendent of the Rosiclare Lead & Fluorspar Mining Company, is chairman of the Flood Wall committee which is supporting this project as it is expected to prevent future damage to mining properties during the flood periods of the Ohio River.

Chilean Engineer Tours Country For Ideas On Aggregate Production

A recent visitor in PIT AND QUARRY'S offices was Pierre Lehman C., a recent civil engineering graduate from the University of Chile. Mr. Lehman and three classmates, Carlos Campino, Roberto Lepe, and Helios Piquer in November 1945, founded the construction firm of Empresa Constructora Delta (Campino, Lehman, Lepe, and Piquer, Ltd.) which is working on highway contracts in the vicinity of Santiago, Chile. One of the chief problems encountered in this work was the shortage and high cost of aggregates due to hand labor production methods.

The four partners agreed that what Sanitago needs is a modern sand and gravel plant of about 100 tons per hour capacity. Mr. Lehman was commissioned to come to this country to study plants, operating methods and equipment, which will be purchased after his return. After 2 months here, Mr. Lehman flew to Europe where he is making a similar study, and will also visit relatives in France. He expects to be back in Santiago in about 2 months.

Peruvian Development Program Includes New Cement Plant

Current projects under way in the nonmetallic mineral development of Peru include a new cement plant under construction in Arequipa and another proposed for the vicinity of Lima. Gypsum deposits throughout the country are undergoing exploitation; barite, kaolin, magnesium sulphate, and others have attained considerable importance with the growth of Peruvian glass, porcelain, and paint industries. Ochers and magnesium sulphate are being produced in the Santa River region, 60 miles inland from the port of Chimbote, where Nicholas Garatea, owner of the deposits, has set up a small extraction plant.

In this illustration, workmen are loading on board an American Airlines C54 transport plane at Milwaukee the head and shaft of a Symons cone crusher. With the eccentric gear and other parts for a 5½-foot crusher, the total weight of the Nordberg Manufacturing Company shipment was 16,558 pounds. The plane left Milwaukee at 2:30 p.m. and arrived three hours later at LaGuardia, Field, to be rushed at once to a New Jersey producer. The air express saved costly working time, as the crusher parts were installed over the week-end without a shut-down.

Convention Attendance Indicates Interest in A. S. T. M. Program

ACTIVITY during the 49th annual meeting of the American Society for Testing Materials, held throughout the week beginning June 24, at the Statler Hotel, Buffalo, N. Y., indicated the intensive interest in the Society's rapidly expanding work on specifications and tests for materials and methods of evaluating assemblies of these materials. The total registration for the week was 1,825, second highest for this annual event, exceeded only by the 1944 meeting in New York City.

The quality and character of the technical sessions made this meeting an exceptionally outstanding one. There were eight symposiums with technical papers, ranging in number from four to fifteen, covering a diversity of fields which included freezing and thawing tests of concrete. In addition to these symposiums, there were other sessions devoted to the effect of temperature on metals, cement and concrete, plastics, non-ferrous metals, and bituminous materials. Twenty-five sessions were required to provide adequate time for all the papers and reports.

One of the high points of the convention was the annual meeting dinner sponsored by the Buffalo Committee on Arrangements which functioned under the chairmanship of T. L. Mayer, head, Department of Technology, Buffalo Public Library. President J. R. Townsend gave his presidential address on "The Challenge of National and International Affairs to the Engineer," and the guest speaker, Dr. B. K. Sandwell, editor of Canada's famous publication, *Saturday Night*, spoke on "A Testing Time for Canada."

A feature of the meeting was the Edgar Marburg Lecture by Dr. J. J. Mattiello, technical director, Hilo Varnish Corp., on the topic "Protective Organic Coatings as Engineering Materials." The nineteenth award of the Charles B. Dudley Medal was then made to H. R. Copson, research chemist, of the International Nickel Company, Inc. C. W. Muhlenbruch was the recipient of the Sanford E. Thompson Award for the most outstanding paper on concrete and concrete aggregates.

Forty-four new tentatives were approved during the meeting, and a large number of revisions of existing standards and tentatives was made. Proposed specifications and tests, published for a year or more for comment and use prior to adoption as standard, were included in the tentatives. Forty-two specifications and methods were adopted as standard.

The cement and concrete sessions were spirited by committee reports, technical papers, and a symposium on freezing and thawing tests of concrete. It was recommended that Committee C-9 be organized for test and research work; three proposed divisions of the committee are: administrative, research, and tests and test methods. This, it is thought, will better distribute committee projects, making the individual assignments more specific.

Two new subcommittees were formed; one to work with admixtures for concrete and as additives, and the other to deal with problems of chemical reaction between cement and aggregates. Increased application of air-entraining agents is expected to provoke considerable activity for the former.

The report of Subcommittee 7, on methods and apparatus for testing concrete, recommended: development of a larger size slump cone to accommodate larger aggregate sizes, greater investigation of and reports on available methods of determining the air content of concrete, and development of a standard method for evaluating the modulus of elasticity of concrete as applied in road slab design. It was further suggested that, in order to obtain test data as a basis for a standard, a symposium be arranged to study the gravimetric, Indiana, and Boyle's law methods of air content determination.

Committee C-9 on concrete and concrete aggregates reviewed the possibilities as discussed by Subcommittee 18, of including in specifications the used of non-agitating equipment for ready mixed concrete deliveries, and severance of supplier responsibility at point of delivery if no testing facilities are provided. The committee also issued new definitions (C125-T), covering admixtures, gravel, crushed gravel, crushed stone, blast-furnace slag, flat price, fineness modulus, and water-cement ratio, to replace C125-44 relating to concrete and concrete aggregates. Other changes made affected standards C87-44, C33-44, C136-39, and C88-44T.

Results of a study of the lean mortar bar test as a measure of Portland cement resistance to sulphates were written into the report of Committee C-1. Tests were performed on 10 cements in 6 different cooperating laboratories. Reports were also presented on mortar bar tests of aggregates combined with cements of varying alkali content. Six cements, ranging from 0.16 to 1.37 per cent. in alkali content, and 5 aggregates were used; expansion measurements were made up to 52 weeks.

Portland cement specifications (C150-44) were revised to permit 2½ and 3 per cent. SO_3 content in Types 1 and 3 cements respectively when the C_3A content exceeds 8 per cent. Tentative methods of chemical analysis of Portland cement covering rapid methods for sodium oxide and potassium oxide, method for sulphide sulphur, and alternate method for rapid determination of sulphur trioxide by turbidimetry, were recommended for adoption as standard. Methods for determining vinsol resin in cement, sections 11 to 13 (C144-44T), are to continue as tentative. Standard mortar air content limits were raised to 16 per cent. plus or minus 4 per cent. for air-entraining cement.

Professor M. O. Withey, University of Wisconsin, opened the symposium on freezing and thawing by stressing the need for further research and data to be used in predicting the effects on materials subjected to climatic cycles. His observations of laboratory tests are that 25 cycles of accelerated laboratory treatment might be considered as severe as 10 to 20 years of natural freezing and thawing. Professor Withey emphasized the need for basic research to determine the causes of concrete breakdown under freezing and thawing, and experiments to develop standard tests for determining the durability of cement pastes, mortars, masonry, and concrete products. He closed his discussion by advising that more data should be obtained from temperature *vs.* time measurements of exposed structures in order to better interpret freezing and thawing test results.

General conclusions drawn from the symposium discussions are: a thoroughly dependable method of freezing and thawing testing has not been achieved as yet; there is a need for accelerated tests which more nearly duplicate natural conditions of exposure; and there must be greater observation of deterioration from exposure of structures already in service.

William Lerch, research chemist for the Portland Cement Association, presented a paper on his investigations entitled "The Influence of Gypsum on the Hydration and Properties of Portland Cement Pastes." Mr. Lerch's work was based on the theory that the gypsum required to properly control the hydration and hardening of cement pastes would vary with the chemical composition and fineness of the cement.

Twelve commercial clinkers of common cement compositions were used in his tests. The results obtained by colorimetric methods, and tests for strength, contraction, and expansion indicate an optimum sulphur trioxide content for the various clinkers, that the high coefficients of contraction of the tricalcium aluminate and alkalies can be reduced, and that the control of the gypsum content will practically equalize the contraction of different cement compositions. It was also found that gypsum retards hydration in some cements while accelerating it in others. In many cements, strengths increased and contraction upon drying decreased by using gypsum in excess of that permitted in the specifications.

F. B. Hornibrook, Master Builders Research Laboratories, presented a paper, "Study of Durability and Void Characteristics of Concretes Containing Admixtures, Principally Air-Entraining Types," which covered studies, observations, and data obtained from experiments with different types of air-entraining admixtures and two types of cement clinker. Durability of the concretes were found, generally, to be lower for concretes of 3 per cent. air by volume than for those containing 6 per cent. or more. Air permeabilities for concretes subjected to freezing and thawing were higher than those not so treated, rich mixes resulted in lower air permeability than observed in lean mixes.

On the theory that the addition of asphalt to concrete floors results in greater comfort, toughness, and thermal qualities, F. O. Andregg, Pierce Foundation, presented a paper, "Concrete Flooring with Asphalt Admixtures," which described "asphalt plasticized" concrete floors. Mr. Andregg's observations were based on experiments using 3½-bag concrete to which was added asphalt in quantities of less than 5 per cent. by weight of aggregate. Structural and physical characteristics of such concrete were materially the same as for untreated or "normal" concrete.

Three specifications for structural lime: Normal Finishing Hydrated Lime, Special Finishing Hydrated Lime (Type S), and Hydrated Lime for Masonry Purposes (Types N and S), were approved as standard by Committee C-7 on lime. It was decided to submit a form to lime producers, listing the important industries using lime, and requesting that they submit to Subcommittee 3 any specifications under which they may supply lime for particular applications. Subcommittees 5 and 9 were merged to form Subcommittee 11 on Research and Methods of test and will function under the chairmanship of Dr. C. R. Austin, Battelle Institute. Projects under consideration by the new committee include methods of test for settling rates, procedures for analysis of limes for arsenic, fluorine, and lead, and a procedure for measuring the relative volume change characteristics of limes.

Other technical papers relative to cement and concrete which were presented at this annual meeting are: "Modulus of Elasticity of Aggregates and Its Effect on Concrete", by H. A. LaRue, University of Missouri; and "A Method of Particle Size Determination of Soils, Cement, etc., by Means of Chainomatic Specific Gravity Balance", by E. V. Barrett, chief of the materials testing laboratory of the Ministry of Public Works, Caracas, Venezuela.

Arthur W. Carpenter, manager of testing laboratories, The B. F. Goodrich Company, Akron, Ohio, was elected president of the Society for 1946-1947, succeeding J. R. Townsend, materials engineer, Bell Telephone Laboratories, Inc., New York, who will continue on the board of directors for 3 years as a past-president. R. L. Templin, assistant director of research and chief engineer of tests, Aluminum Company of America, New Kensington, Pa., is the new vice-president to serve with the Senior Vice-President T. A. Boyd, head, Fuel Department, Research Laboratories Division, General Motors Corporation, Detroit, Mich.

U. S. Gypsum Employees End 23-Day Strike at Trenton

A twenty-three-day work stoppage at the United States Gypsum Company plant, in Jersey City, N. J., ended recently with the signing of a 1-year contract between the company and Local 846 of the International Mine, Mill and Smelter Workers, a C.I.O. affiliate. The stoppage began when the union charged that 72 of the 160 production workers were suspended for union activity. The new contract provides for reinstatement of the 72 workers and a blanket $.185-an-hour wage increase.

Postpone Celebration And World Conference On Minerals Until 1947

Postponement of the "World Conference on Mineral Resources," to be held in conjunction with the 75th A. I. M. E. Anniversary Celebration, until the week of March 17, 1947, was decided by the Board of Directors at a recent meeting. Hotel accommodations as required by the United Nations meetings, scheduled for September 3, has made it impossible to accommodate the A. I. M. E. conference as originally scheduled for September 16-18. No essential changes will be made in the character and scope of the sessions, and The Waldorf-Astoria Hotel in New York City is to be the official headquarters. The program now calls for the scheduling of the annual February meeting of the Institute for the same week—March 17, 1947. This arrangement is intended to provide the opportunity for the foreign delegates who will attend the Celebration-Conference, to attend the technical sessions of the annual meeting; also, members of the Institute who wish to attend the Anniversary Celebration, may conveniently attend both meetings.

Nick Fliss, employee of the National Gypsum Company, grins as he points to the slightly dented helmet which saved his life. Mr. Fliss had checked the mine roof in the room where he was working when a break started in another room and a large slab of rock peeled across the roof, striking him and knocking him down. The helmet withstood the blow, however, preventing injury to Mr. Fliss. He received a new helmet, and the one that did its job so well is being saved to serve as a reminder that the Mine Safety Appliances Company helmets, provided by the company, are much stronger than the human skull.

The large fluorspar, lead, and zinc reduction plant, erected last year near Salem, Ky., by Alco Minerals, Inc., has advanced steadily into production. The company purchased the old Summers property and erected its flotation plant to handle low-grade materials gathered from dumps, old workings, and mines of low-grade output. Albert Melhman, of Marion, is president of the company, and I. W. Andrews is serving as plant superintendent.

Hydroseparator at Coronet Phosphate Plant Facilitates Recovery of Fines

another ON THE SPOT report

IN order to accomplish a better separation between slime rejects and recoverable fine phosphate rock, the Coronet Phosphate Company in March of this year began operating at its Hopewell, Florida, washing plant a 150-foot diameter hydroseparator incorporating several unique design features. Developed and designed by the Process Equipment Division of the General American Transportation Corporation, the new machine is known as the General American Type TTH (or torque-tube) hydroseparator.

The machine was designed to effect the continuous recovery of fine phosphate rock present in washer debris, ranging in size from 14- to 150-mesh and containing variable amounts of minus-150-mesh slime. Since the minus-150-mesh product is difficult as well as expensive to recover, every effort is being made in the operation of the new hydroseparator to obtain a 150-mesh separation. Whereas formerly the company had to depend on old settling basins in order to operate its recovery plant at full capacity, the 150-foot hydroseparator has been furnishing more than enough "heads" for this purpose, with the additional advantage that the circuit is fully closed and does away with the necessity of pumping the material back from the settling areas.

One of the more serious problems affecting virtually all phosphate-rock-recovery operations is the wide and sudden variations which occur in the matrix. The recoverable fraction of the rock may (and frequently does) double from one hour to the next, and both the screen analyses and the proportions of flotation feed, washer pebble and slime vary in every cubic yard of matrix recovered. Under such conditions it becomes exceedingly difficult to maintain a sufficiently uniform rate of feed for the efficient operation of a flotation plant, and every possible effort must be made in the design and layout of equipment to permit rapid adjustments. It is in this regard, and in the extent to which *automatic* flexibility and adjustment have been achieved, that the Hopewell installation seems to make an important contribution to the technology of phosphate rock recovery.

A view of the150-foot hydroseparator at the Coronet Phosphate Company's plant at Hopewell, Florida, before it was placed in operation. In the foreground is one of the two outlets for the overflow launders. Feed launder is suspended from truss.

By WILLIAM M. AVERY

The entire mechanism of the 150-foot hydroseparator rests on a concrete footing at the center of the tank. A hollow steel torque tube is used instead of a solid concrete pier, obviating the necessity of running a tunnel under the machine for access to the underflow line. The turntable on top of the torque tube contains two independent trains of

General view of the hydroseparator. Feed launder is at left. Dilution water is pumped through 28-inch pipe above dam.

gears driven by independent pinions and engaging a 10-foot diameter bull wheel. The rotating motion is transmitted to the driving drum on which the raking arms are mounted by means of two 24-inch-diameter wheels seated on vertical tracks.

In designing the hydroseparator permanent concrete work was held to the minimum in order to simplify the problem of moving the machine to another location at some time in the future. The side wall of the tank is a simple earth dam, and the unpaved floor was quickly leveled and filled with phosphate rock by the sweeping action of the rakes.

One of the unique features of the machine is the hydraulic lifting system mounted at the bottom of the torque tube. The 28-inch-diameter cylinder has a total lift of 25¼ inches, and is operated with oil delivered at 125 pounds pressure by a Viking pump mounted on the superstructure. Eight rollers on the lifting drum engage vertical tracks mounted on the inside of the torque tube. A cross-frame, supporting four conical roller bearings, is mounted on top of the lifting drum and extends to the outside of the torque tube through slots in the side wall. The bearings support a lower and an upper track on which the driving drum, carrying the entire raking mechanism, is mounted. This novel arrangement for transmitting torque makes it possible to raise or lower the raking mechanism while the machine is developing its full design torque.

Special controls furnished by Cutler-Hammer can make the operation of the torque-tube hydroseparator largely automatic. Four direct-current power relays on the control board cut in successively as the power absorbed by the 20-horsepower-drive motor reaches 6, 9, 12 and 20 kilowatts. At 6 kilowatts a solenoid valve closes the return line of the hydraulic system, and at 9 kilowatts the oil pump cuts in to lift the raking mechanism. If the load on the drive motor continues to build up an alarm bell sounds at 12 kilowatts. At 20 kilowatts the motor circuit is broken, and the machine stops.

W. H. Taylor, superintendent (left), and John C. Yost, engineer, examine a grab sample taken from the overflow launder.

The system is also kept in balance by both manual and automatic control of the 12-inch Georgia Iron Works underflow pump. The 100-horsepower wound-rotor motor which drives the pump is equipped with an 8-point drum controller, with the 6th, 7th and 8th points connected to the main control board for automatic regulation of the pump speed. When the pump is operating at the minimum automatic speed (*i. e.* on the 6th point of the drum controller), the speed automatically increases from 380 to 430 r.p.m. when the oil pump motor starts up, and increases to the maximum of 480 r.p.m. when the alarm bell sounds. The underflow pump has a 38-inch impeller. It is located outside the earth dam.

The provision for variable-speed operation of the underflow pump enables the system to handle the severe tonnage surges that occur without encountering high underflow dilution during periods of average load. The importance of this is evident from the fact that peak underflow loads are at times more than double the average load. Surge loads are stored temporarily within the hydroseparator when the rakes are lifted to reduce the load on the 20-horsepower drive motor. This action, in combination with the variable pump speed, tends to produce a high underflow density, which reduces the slime content of the feed for the flotation plant.

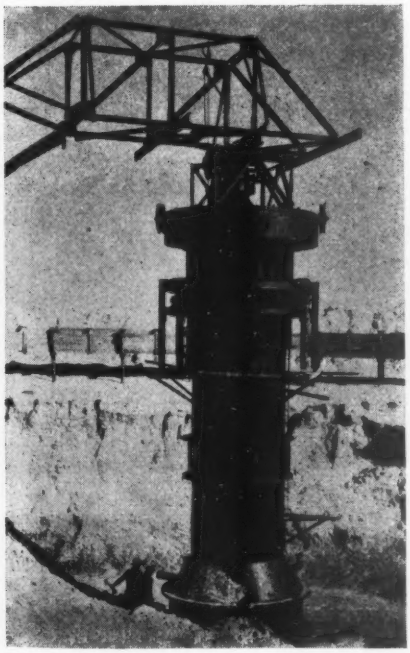
The machine makes one full revolution in five minutes. Under continuous operating conditions it can develop a torque of 450,000 foot-pounds, and the raking mechanism has been designed so that the full load may be applied safely to the extreme end of one long arm. Under eccentric load conditions, the tilting

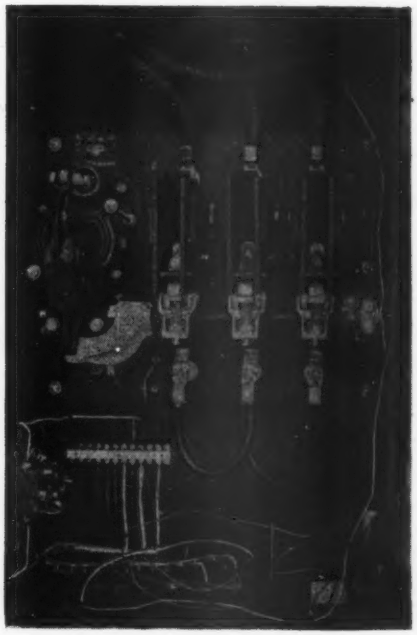
(*Continued on page* 92)

Left: Close-up view of the torque tube before the rakes had been mounted.

Below: Underflow enters through three 6-inch pipes visible at bottom of tube.

Right: Underflow from new hydroseparator is handled by a 10-inch pump. The controls by which the rake mechanism is automatically raised or lowered as the load fluctuates.





MOTOR MAINTENANCE PREVENTS BREAKDOWNS

Seldom has it been the pleasure of Pit and Quarry to present to its readers a more important and helpful article than this. Due to the unusually severe conditions under which electric motors in this field must operate, every producer, large or small, should profit from the helpful suggestions made in it.

In this issue this helpful article is presented in full. In the October issue we will publish a complete set of maintenance check charts which will enable anyone to diagnose the ailments of an electric motor and in many cases to correct them before serious damage or costly delays occur.

After the October issue appears, every Pit and Quarry subscriber may have a reprint of the entire article and chart by writing in for it.—The Editor.

By PHELAN McSHANE
Manager, Petroleum Chemical and Mining Section Industry Engineering Dept.
and
W. W. McCULLOUGH
Supervisor, Repair Engineering Manufacturing & Repair Dept.
Westinghouse Electric Corporation
East Pittsburgh, Pennsylvania

another P&Q exclusive

ELECTRICAL equipment in the nonmetallic mineral industries must operate under conditions which are far from favorable. It is subjected on occasions to excessive moisture, and must almost always operate in an atmosphere laden with dust and at times fumes which attack exposed and unprotected electrical parts.

Maintenance of this electrical equipment presents an operating problem, the proper solution of which is of the utmost importance to the industry. An adequate and well supervised maintenance program will go far toward improving operating efficiency and in making existing equipment last longer.

The ideal motor maintenance program aims at prevention of breakdown rather than repair. Maintenance involves competent, periodic and systematic inspection. A thorough survey of each motor installation should be made and a systematic inspection and maintenance schedule established and enforced.

Best results accrue when records are kept consistently on the schedule selected. Several excellent record systems have been developed and reduced to printed form, so that it is not necessary to go to the trouble and expense of devising individual systems.

Prevention of breakdowns may be helped by a thorough analysis of the equipment involved. For example, if the difficulty is the frequent tripping of overload relays, it may be the installation of a different type of relay with thermoguards on the motor will enable the motor to carry the loads without an injurious temperature rise.

Left, Figure 1—Cutaway view of direct-current motor showing: 1) field coils; 2) armature; 3) armature coils; 4) commutator; 5) brush rigging; 6) sleeve bearing; 7) oil overflow and filter plug.

Right, Figure 2—Cutaway view of alternating-current squirrel cage motor showing: 1) stator coils; 2) squirrel cage rotor; 3) sleeve bearings; 4) oil overflow and filter plug.

Maintenance Schedules Should Include Systematic Inspection

It is impossible to give any hard and fast rules for frequency of inspection. The following suggestions are based on average conditions found in paper mills.

Once a week check oil level in the bearings and see that the oil rings are moving freely. Check the temperature of the motor bearings and primary iron with the hand. Sniff the warm air coming from open motors. The fumes emanating from overheated insulation are unmistakable.

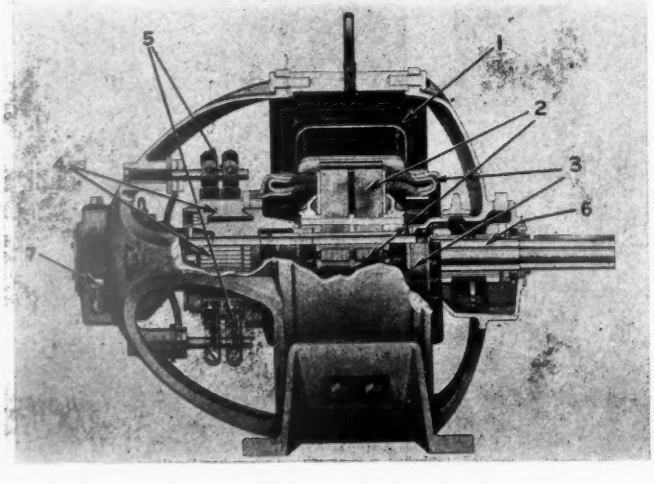
Once a month check the brush holders, brushes and shunts. Blow out the motor with compressed air.

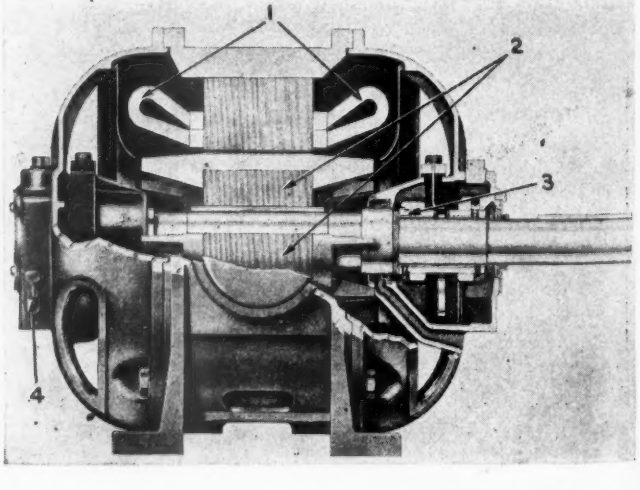
Once a year check air gap with feeler gauge. Check insulation resistance with Megger. Check line voltage with voltmeter, and load with ammeter. Clean out and replace grease in ball and roller bearings. Check renewal parts stock in light of the past years' experience.

Every two years dismantle the motor. See that all windings are tight. Replace loose wedges and loose bands before dipping in varnish and baking. Inspect commutators and commutator connections. Sleeve bearings require no flushing. At intervals of about 2 years in average service, or during general overhaul periods, remove the bracket and wash out the bearing housing. Use hot kerosene oil and compressed air if available.

Faulty Bearings Cause Most Motor Failures

All motors depend upon a mechanical assembly of some sort for the transformation of electrical





energy into mechanical energy or work. The bearings are a very important link in this mechanical assembly.

Bearings probably cause more shutdowns, delay and expense, than any other cause. This is not surprising, when it is remembered that they are victims of poor foundations, misalignment, vibration, thrust from couplings, dirt, under-and over-lubrication, and frequently the wrong lubricant. All this in addition to their real job of supporting a rapidly revolving part.

Elsewhere suggestions are made to minimize or eliminate some of these causes of failure, but a study of motor bearings may be helpful.

The first requirement of successful bearing operation is lubrication. This entails more than just an adequate supply of lubricant; the lubricant, the bearing design, and its condition, must be correct.

Proper Lubrication Dissipates Heat in Bearing

Sleeve bearings sustain the essential oil film to prevent metal-to-metal contact between the shaft and the bearing surface. Properly designed bearings have adequate area for the load, proper oil grooving, working oil rings, and suitable materials.

Safe operating temperature for bearings under normal operating conditions is considered to be 40 deg. C. rise above the surrounding room air. At this temperature a bearing feels only comfortably warm to the hand. Assuming proper mechanical condition of the bearing, whether sleeve or ball, and the bearing assembly, and assuming that proper lubricants are used, temperatures elevated above 40 deg. C. rise call for immediate investigation.

Oil Film Lubricates Sleeve Bearings

In a sleeve bearing the oil sticks to the shaft and is dragged along by the rotation of the shaft so as to form a wedge-shaped film between the shaft and the bearing. This film of oil carries the load, and prevents metal-to-metal contact. So long as this film is established and maintained there is no metal-to-metal contact in the bearing while the shaft is rotating, and, therefore, no perceptible wear.

Two outstanding considerations govern the maintenance of sleeve bearings. First, is to insure the existence of the oil film once rotation has begun. *Use the right oil.* The second is to minimize the destructive effects of metal-to-metal contact when the film is lost, either by accident, or during the starting period. *Use the right babbitt.*

For sleeve bearings, proper maintenance keeps oil well filled to the proper level and the oil rings turning freely. New oil should be added only when the motor is at rest to prevent overfilling of the reservoir. Oiling of bearings is more often overdone than underdone. Sleeve bearings which require frequent refilling and thereby leak oil onto the stator windings should be replaced with sealed sleeve-type brackets and bearings.

It is well known that oil rings generally carry far more oil than is necessary for proper lubrication of the bearing. When running, most of this oil is carried on the outside diameter of the rings. This excess oil causes splashing and spray inside of the bearing housing. Air currents that pass through the housing pick this spray up and deposit it on motor windings. Sealing the bearing against the entry of air currents is therefore necessary and is accomplished in all modern designs by close tolerances, felt seals, and air bypasses to offset blower action of rotating parts.

The purpose of the felt washer in these seals is often misunderstood. The real purpose of the felt is to keep out air and dirt. In itself it has little value for preventing leakage of oil once it becomes oil soaked. Bearing wear, which means radial movement of the shaft, spoils the effectiveness of the bearing seals. Replace all felt seals at the same time when replacing sleeve bearings. These felt seals should be ordered from the manufacturer of the motor. If it is necessary to make them in an emergency, use high-grade felt not less than ¼-inch thick before compression. Make the inside diameter of the washer the same as the shaft or slightly less. Cut the felt true with edges at right angles to the surface of the felt.

Oil leakage is generally aggravated by high temperatures. Keep bearings cool and use an oil that does not foam easily.

"Clicking" Sound May Indicate Ball Bearing Trouble

Ball bearings have become increasingly important with the use of totally-inclosed and fan-cooled motors. In a sleeve bearing, as just explained, the shaft when in motion is separated from the bearing by the oil film. In a ball bearing, a series of steel balls act as the separating medium, both when the motor is stationary and when it is running.

To keep the steel balls uniformly distributed around the bearing a cage or retainer is used, each ball having its own pocket. The balls have rolling contact with the raceway, but sliding contact with the surfaces of the retainer. This means that lubrication is necessary.

Most ball bearings used in horizontal motors are grease lubricated although some supplied with vertical

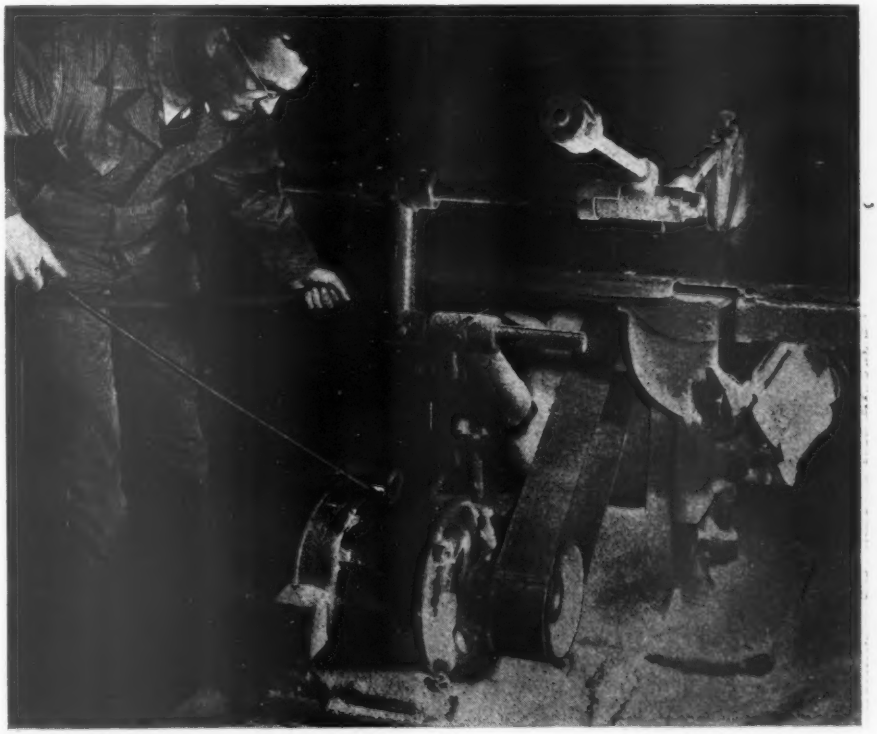


Figure 3—A good way to keep a motor clean in an unusually dusty and dirty location is to use a suction hose to remove surface dust and dirt. An air line can also be used but if it is, the pressure should not exceed 50 lbs.; otherwise it may loosen binding tape and blow dirt under it while windings are being cleaned. Be sure air is free of moisture before directing at insulation.

motors use oil. Follow the advice of the motor manufacturer in selecting a suitable grease. Carelessness in allowing containers to remain open often causes trouble from abrasive dirt. Soda-base soap greases are usually preferred on account of their high melting point and their stability. They mix readily with water, however, and tend to form an emulsion.

Ball bearings in distress can usually be detected by undue heating or by unusual noise. Broken or nicked balls cause rapid destruction of the bearing. They can be detected by the "clicks."

If the conventional 40 deg. C. rise above the surrounding air is exceeded, look for an overfiilled bearing, since the first result of overgreasing is heating caused by churning of the grease. The general rule is that the housing should not be over half full. Clean the old grease from the bearing and from the housing once a year and replace it with new grease. Average service is assumed.

After the machine is dismantled, the bearing should be carefully wrapped in clean cloth or paper to protect it from outside dirt. Remove all old grease from the housing and clean the housing and the bearing either in Stoddard solvent or in carbon tetrachloride. This is a difficult operation because particles of grit are not soluble and are removed with difficulty. Remove final residue of cleaning medium with a light oil before filling with new grease. The container with fresh grease must be carefully protected from dirt. Keep the cover on tight. Use a clean, nonmetallic paddle for applying the fresh grease.

Check Air Gap with 4 Readings

The air gap in a motor is dependent first on proper maintenance of the bearings and second on the proper alignment of the brackets or pedestals with the frame. Alternating-current motors operate with less gap than direct-current motors, and are therefore more critical. Check the air gap with a feeler gauge at the established schedule period. Make these checks at the pulley end, taking 4 readings on each motor, 90 deg. apart. For motors below 10 hp., a minimum gap of .005 in. should be maintained. Above 10 hp. the minimum gap should be .010 in.

Figure 4—Oiling the motor regularly is essential to long bearing and shaft life. Too much oil may contaminate the motor windings, causing possible deterioration of the insulation.

Couplings Require Parallel Alignment

Where coupled type motors are used, the couplings require regular inspection. Faulty alignment in a solid coupling is reflected in bearing trouble and vibration. Make sure that all dowel pins are in correct position and check the faces of the couplings with a feeler gauge after the bolts have been removed. Shift the motor position to make the faces of the two half couplings parallel.

Flexible couplings will operate under more severe misalignment without causing trouble; however, the two halves should be checked with a steel scale to make sure that they are in alignment. Any misalignment means increased wear on the pins, fingers, and leather discs, whichever may be used. Special type flexible couplings should be checked according to the manufacturer's instructions.

Insulation Must Be Clean and Dry

The electrical conductors in a motor are separated from the magnetic circuit and from the mechanical assembly by materials generally grouped under the term "insulation." Insulation is also used in commutators to separate the bars from each other and in coils to isolate individual turns. It is important that the insulation be maintained so as to function as a separator between the copper coils in the motor and the mechanical assembly. Regardless of the class of insulation used, remember that electrical insulation materials are non-conductors only when clean and dry.

Figure 5—Eleven years of severe and continuous service showed a bearing wear of less than 15/10,000 of an inch; thanks to proper lubrication and intelligent maintenance. At this rate of wear it is estimated that bearing replacement would not be necessary for at least 90 more years.

The importance of keeping electrical equipment clean and dry is always worth stressing. Accumulations of dust and dirt not only contribute to insulation breakdown, but they operate to increase the motor temperature through restrictions of ventilation. Dust and dirt is effectively removed with compressed air at about 50 pounds pressure. Do not direct compressed air against the insulation until certain that it is free from moisture that may have accumulated in the air line from condensation. Too great an air pressure may loosen the binding tape or injure the insulation by sandblasting with the abrasive dirt which is nearly always present. It may not be possible to remove all dust and dirt by blowing with compressed air. If the accumulation of dirt contains oil or grease, a solvent will usually be required to remove it.

There are three types of solvents in general use for this purpose. These are petroleum distillates, such as Stoddard solvent or cleaners' naphtha, carbon tetrachloride, and a mixture of the two. The petroleum distillates are the solvents having the least corrosive action on insulation varnishes, and for that reason where conditions permit are preferable to the others. The Stoddard type solvent, produced by all the major oil companies, with a minimum flash point of 100 deg. F., minimizes the fire hazard, and should be used in preference to gasoline or benzene. Every precau-

Figure 6—When the motor commutator wears down, undercutting the mica 1/16 inch below the surface of the faster-wearing copper commutator bars on a d.-c. motor will prevent sparking and assure proper operation of the motor.

tion should be taken however, to prevent fires or explosions.

When this type of solvent will not properly clean the apparatus a mixture of carbon tetrachloride and the solvent may be used. A mixture of 50 per cent. carbon tetrachloride and 50 per cent. Stoddard solvent is nonflammable, but the vapors mixed with a right proportion of air are explosive. In extreme cases it may be necessary to use straight carbon tetrachloride; however, the toxic effect of this material on the operator must be taken into consideration.

Carbon tetrachloride is more corrosive in its action than petroleum solvents, and it evaporates much more rapidly. For this reason the residue of carbon tetrachloride should be removed by applying a petroleum solvent. This will prevent corrosion later on.

Before any solvent is used, be sure that there is a good ventilation and minimum fire risk. Do not let the workers' clothing become saturated with the solvent. Always have fire extinguishers of the carbon tetrachloride type handy. If a hose is used to spray either cleaning solution or varnish, make sure that the nozzle is grounded. Workmen should be guarded against breathing the fumes of carbon tetrachloride and they should be under the close observation of someone familiar with artificial respiration. Where conditions are particularly bad, such as in pits, gas masks should be worn.

The time to apply varnish treatment is after the motor has been thoroughly cleaned in solvent. Use a baking varnish recommended by the supplier for the particular conditions encountered. Two dips and bakes may be sufficient for normal conditions, while for extreme conditions of moisture and corrosive gases four dips and bakes may be justified. One or two additional coats of red synthetic enamel may be justified under extreme conditions.

Dry the motor in an oven before dipping in varnish. Electric or steam heat is the safest and most convenient. Make sure that suitable temperature control is provided and that it is effective so as to prevent injury to the insulation. Maximum dry-out temperature is 115 deg. C. Baking temperature for the varnish and length of the baking period will depend on the type of varnish used.

Insulation Testing Determines Comparative Conditions

Insulation tests are made to determine the condition of the insulation rather than the quality of the insulation. While special conditions may justify dielectric tests, over-potential tests, high-frequency tests, or dielectric power factor tests, a test to determine the insulation resistance is generally all that is required in maintenance work. Use Class B insulation for motors whose history shows breakdowns resulting from operation at elevated temperatures.

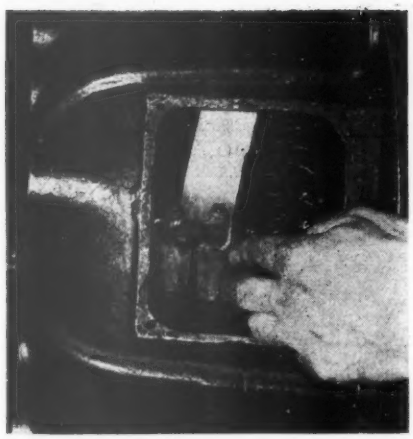


Figure 7—A thorough maintenance program does not neglect brushes. Proper method of cleaning and surfacing is to press brush down on a strip of No. 0 or No. 00 sandpaper placed sanded side up between brush and commutator and then pull circumferentially in the direction of rotation—not across the brush face.

The most convenient way to read insulation resistance is with a Megger. The 500-volt type is generally used. A higher-voltage Megger may damage low-voltage insulation. Remember that the readings are valuable only from a comparative standpoint and that they vary greatly with the temperature of the apparatus. A safe general rule is that the insulation resistance should be approximately one megohm for each 1,000 volts of operating voltage, with one megohm as a minimum.

Totally Enclosed Motors Protected from Outside Air

Totally-enclosed motors, totally-enclosed fan-cooled motors, and totally-enclosed explosion-resisting motors, all have the frames sealed so as to exclude the outside air. They are well protected against the admission of abrasive dirt and metallic particles that shorten the life of insulation in open motors. For these enclosed motors there are two points to observe.

First, see that all exposed joints in the motor frame and brackets are tight. Use a water-resistant grease in the bracket fits, if the motor is dismantled for any reason. This will help to prevent accumulation of water in the bottom of the motor frame.

Second, make sure that the motor is provided with a drain plug or drain pipe at the bottom of the frame so that any accumulated water can be removed before causing trouble.

Careful Handling Required for Direct-Current Motor Repair

Direct-current motors add the commutator and its current-collecting details to the general maintenance problem. The armature is the heart of the direct-current motor. Through it flows the main-line current, and if the machine is overloaded the armature is the first to give evidence of distress.

When dismantling a d.-c. motor for periodic overhauling the following points should be observed. Do not roll the armature on the floor; a coil may be injured or the steel banding wire may be nicked. Support or lift the armature only by its shaft if possible. Never allow the weight of the armature to rest on the commutator or on the coils. Inspect the coils carefully to see that they are tight and where necessary replace the wedges. Replace any bands that may be loose.

As far as possible duplicate the banding originally furnished by the manufacturer. Do not change the material in the banding wire, the diameter of the banding wire, or the width or position of the band. Increasing the band width may cause heavy currents in the bands sufficient to melt the solder.

Only experienced workmen should tighten loose commutators. If the commutator bars are tight they will give out a clear bell-like ring when tapped lightly with a small hammer. If the commutator does not ring, but gives out a flat sound when struck, the front Vee should be tightened.

The exposed portion of the front mica V ring is normally a catch-all for oil and dirt. This section should be cleaned and protected with a layer of surgical tape and twine to prevent flash-overs and breakdown to ground. Red synthetic enamel will give a smooth finish, resistant to oil and carbon dust.

Uniform Spring Tension on Brushes Prevents Selective Action

Check the brush rigging carefully. Most brush holders in use today are box type, and the brush holder should be replaced when the inside broached section is worn.

The brushes themselves must fit properly, not so tightly as to stick, and not so loosely as to shift position when running. Make sure that the grade used is correct for the application, using the advice of the manufacturer of the motor. Make

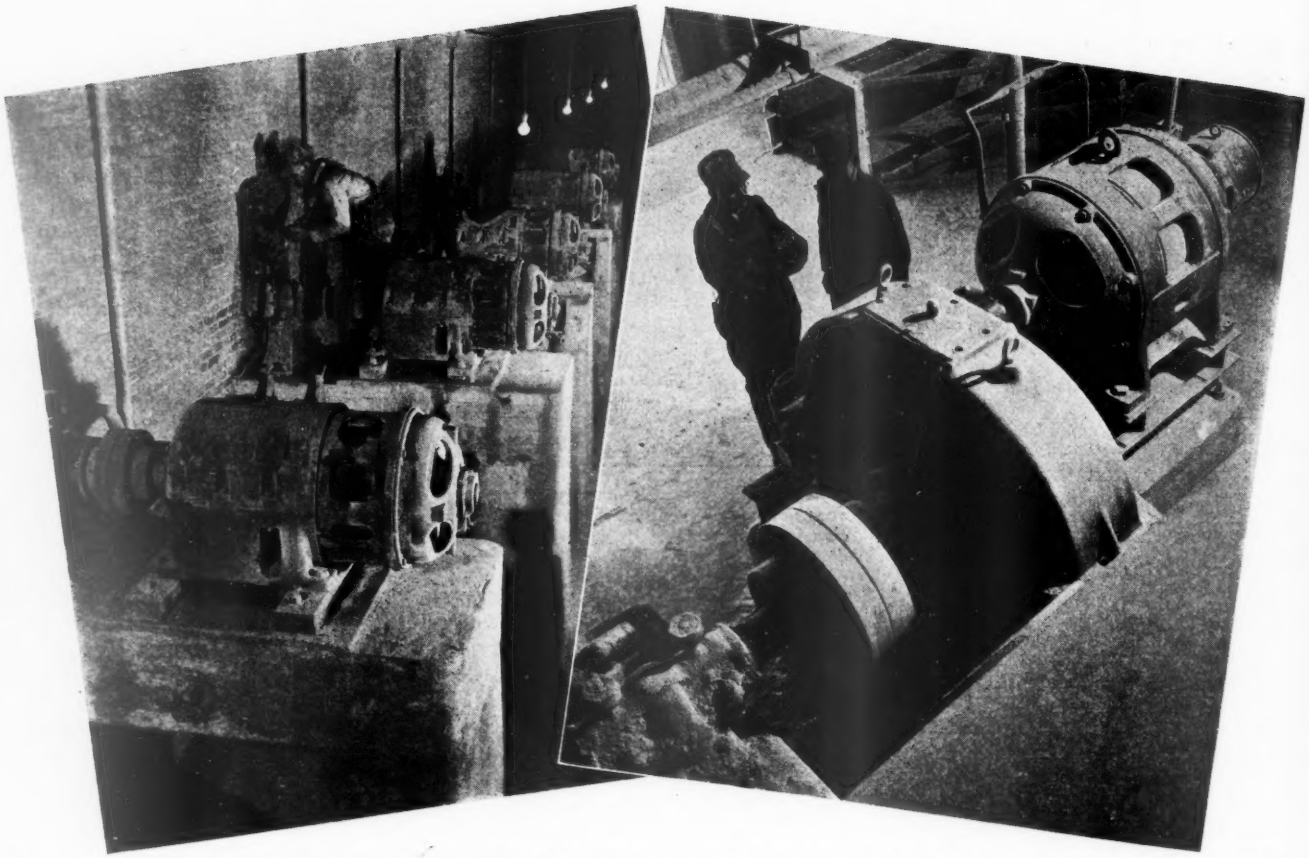


Figure 8, left—These 50-hp. gearmotors for driving finish ball mills are mounted on concrete foundations that provide absolute rigidity, a fundamental must in the installation of geared drives.

Figure 9, right—This 150-hp. synchronous motor that drives a raw tube mill through a gear reducer shows the results of periodic cleaning when compared to the bearing journal to the left.

sure that the fit of the brush on the commutator extends across the face of the brush.

The spring tension on the brushes should be uniform so as to prevent selective action. The correct pressure will vary with the design of the machine and adjustments should follow the recommendation of the manufacturer. The brushes should be staggered in pairs of arms to prevent grooving of the commutator. Brush shunts should be kept tight and free from excessive corrosion so that current will be uniformly distributed to the brushes. Under bad conditions of corrosive atmosphere the shunts can be protected by dipping in melted paraffin or in synthetic red enamel or by covering with woven cotton tubing.

Resurfacing of the commutator should be done in a lathe, or with a grinding rig. As it is impossible to obtain a true surface with a hand stone, it should be used only as an emergency. Practically all up-to-date d.-c. machines have undercut mica in the commutators. This undercutting should be kept 1/16 in. deep.

Lubricating Oils for Gearmotors Vary with Speed and Load

A gearmotor is a self-contained drive made up of a ball-bearing motor and a speed-reducing gear unit. It is designed to take adantage of the electrical efficiency of the high-speed motor and the transmission efficiency of accurately cut and properly designed gears.

Suggestions already given apply to the motor element of the gearmotor unit. Front and motor bearings are generally grease-lubricated and require the same attention as in standard ball-bearing motors. Rear bearings, gearbox bearings, and the gears themselves are almost always splash-lubricated from the same oil supply reservoir in the lower section of the gear unit. Oil seals at each bearing prevent oil leakage into the motor windings and out along the driving shaft. The precision cut gears demand carefully-selected lubricating oils. Use only top-grade oils of the viscosity called for by the manufacturer of the gearmotor. Give full particulars as to type of units and operating conditions.

The areas of contact on gear teeth

(*Continued on page* 94)

Figure 10—When motors drive kilns, such as this induction motor is doing, it is advisable to provide a protective cover providing adequate space is provided for ventilation.

Marquette Finds Metallizing Process Of Worn Parts a Maintenance Aid

WHAT to do with worn shafts, drums, bearing housings and other parts of equipment requiring replacement because their surface condition forbids continued service is a problem the Marquette Cement Manufacturing Company, at Oglesby, Illinois, has met and overcome with satisfactory results. For the last 8 to 10 years this company has resurfaced worn parts by the metallizing process, which is a method of spraying metal wire onto a surface with a spray gun, building it up so that it can be machined to its original specifications and returned to service.

Welding is another method of building up a worn or damaged surface and has its specific applications, though the Marquette Company has found the metallizing process to be the most successful for its work. One of the main reasons for preferring this process is that the heat transferred during spraying is not of sufficient intensity to cause warping or crystallization of the metal part under repair. With previous methods the heat was so intense that crystallization and warping took place and in trying to straighten the warped section, the part would crack or break where it had crystallized. Since adopting the metallizing process, the company reports that failures are negligible; those which have occurred could be traced to inexperienced operators.

The first and most important step to be taken for a successful metallizing job is to properly prepare the surface to be sprayed. The method used by Marquette includes a thorough cleaning of the surface, plus undercutting so that the finished thickness of sprayed metal will exceed maximum wear. The surface is then "roughed up"; the Marquette operators accomplish this by using a home-made lathe-tool which cuts a very jagged or rough thread. This is not a standard thread and the cuts per inch are varied according to the diameter of the part.

Operator adjusts spray gun as it metallizes the surface of a truck brake drum.

The objective in roughing or cutting jagged threads is to provide a surface to which the sprayed metal will adhere. The bonding principle in metallizing differs from a welding bond in that it is entirely a mechanical bond. The sprayed metal particles interlock with mechanical projections and indentations of the roughed base surface; these particles of sprayed metal are sufficiently plastic to conform to the irregularities of the surface and interlock with them to give a strong bond. When metallizing is used to coat steel as a protection from heat corrosion, the bond is effected by alloying the metals.

Although the intensity of the heat transferred during metallizing is low enough to prevent warping and crystallization, an air stream is directed onto the work as an added precaution to prevent overheating. The Marquette operators shut off the gun from time to time during a long spraying operation to allow the work to cool off.

Left: The spray gun, if properly set, requires little attention while spraying the surface of a 4 15/16-inch-diameter kiln room pinion shaft. Right: The light-gray middle section of the pinion shaft is the part resurfaced. It is now ready for machining.

When a cylindrical part is to be repaired, the surface is sprayed until the diameter of the section is about $\frac{1}{16}$ inch larger than the specifications require; this allows $\frac{1}{32}$ inch of metal for machining. On parts not

This truck brake drum has been roughed preparatory to spraying. Roughing tool may be seen at the left.

cylindrical in shape, approximately $\frac{1}{32}$ inch of sprayed metal is also allowed for filing or grinding to original dimensions.

With the spray wire used by this plant, surfaces of such hardness are obtained that with the best of cutting tools, the machining must be done at very slow speeds. This has not been objectionable as the total time required to repair a surface is relatively short, especially when compared to the time consumed in obtaining a new part, if available, or making it in the shop. Delays or shutdowns, caused by equipment parts in need of resurfacing, have been reduced to a matter of hours by the adoption of the metallizing process. The $4\frac{15}{16}$-inch-diameter kiln drive pinion shaft in the photograph was repaired in about 3 hours at an estimated cost of less than 10 per cent. of the cost of a new shaft. As on all repairs done by Marquette with metallizing, a definite saving in time and cost was realized.

The wearing qualities of a metallized surface are reported to be as good and in many cases better than those of the original surface. The Marquette company has also experienced satisfactory results from resurfacing a part for the second time —the procedure is the same as for a first treatment.

Typical pieces of equipment satisfactorily resurfaced at the Oglesby plant include: a 12-inch-diameter hammermill shaft, armature shafts, internal bore of motor housings, pump impellers and shafts, pump rings and sleeves, a 12-inch trunnion housing for roller bearings, shovel shipper shaft, brake drum on a 43-B Bucyrus-Erie shovel, cable drum on an electric crane, and the crawler sprocket shaft for a Model 4120 Marion shovel.

On a majority of jobs, spraying is done with the part held in a lathe and the spray gun mounted on the lathe-tool holder. As a rule the spray gun nozzle is held about 6 inches from the surface being sprayed.

It is not always necessary to use a lathe—on many jobs a lathe is impractical or unnecessary. A bearing housing for a hammermill at the Marquette plant, because it was in 2 sections, could not be sprayed satisfactorily in a lathe, so the operator sprayed the inside of the two sections by hand. When a pump impeller was repaired at this plant, the surface was "roughed" by blasting with steel grit. Sprayed by hand, the new surface was then filed and ground until it met the original specifications. Shafts having key-ways are sprayed with no departure from standard practice and results; the key-ways are masked to prevent the sprayed metal from changing its dimensions. Many jobs can be done without disassembling the equipment.

The Marquette plant at Oglesby is using a "Metco 2E" metallizing spray gun, spray wire, gauges, and hoses which are all products of the Metallizing Engineering Company, Inc., of Long Island City, N. Y. Oxygen and acetylene gas (15-pounds acetylene pressure) are used to reduce the spray wire to a molten state for spraying. Air pressure, at 65 pounds, is used to operate the turbine, within the gun, which gives the spray wire a steady rate of feed —the rate of feed can be varied. This same air stream also atomizes the molten metal and blows it onto the surface under treatment. Any metal which can be drawn into wire form, can be sprayed, but the Marquette company has been able to do the bulk of its work with either "Sprairon," "Spraysteel" (of both 10 and 25 per cent. carbon content), bronze, or stainless steel.

The fact that 560 pounds of spray wire was used during the last year at the Oglesby plant alone gives some indication of the importance of metallizing in keeping the Marquette plants operating at peak capacity.

Hydroseparator at Coronet

(*From page* 85)

moment is absorbed in the lifting drum.

Although Coronet's flotation plant operates on a 24-hour schedule, due to the character of the deposit mining operations are usually not continuous. With the hydraulic lifting system it is a comparatively simple matter to shut down the machine with a full tank, and to resume operations later by lifting the raking mechanism the proper amount—usually about 6 inches. For this purpose the oil pump which supplies the hydraulic system may be operated by push button. This feature of the design also simplifies the problem of starting the machine after power failures, an especially important consideration at the Coronet mines, which are located in a section where rather frequent interruptions are caused by severe electrical storms.

The 150-foot hydroseparator was designed to handle 7,500 gallons per minute of washer debris in addition to 5,000 gallons per minute of overflow from an existing 40-foot hydroseparator. Dilution water is supplied directly to the machine through a 28-inch diameter pipe line. With dilution water averaging about 8,000 gallons per minute, the normal overflow from the new machine amounts to approximately 20,500 gallons per minute. Although the rate of feed averages around 230 long tons per hour, peaks as high as 400 long tons per hour may be encountered. During peak loads the amount of slime to be rejected is probably not in excess of 100 tons per hour.

At the average feed rate the percentage of solids in the hydroseparator underflow has been found to vary between 25 and 35 per cent. with less than 5 kilowatts being drawn by the drive motor. The hydraulic lift usually goes into operation when the solids reach a level of about 50 per cent., and the alarm bell sounds when the level reaches approximately 70 per cent. solids. These figures, determined from grab samples, are merely indicative of trends.

The results of sample tests made at various times since the hydroseparator went into operation indicate that high efficiency has been attained both in the removal of slimes and in the retention of plus-150-mesh material. It is anticipated that underflow densities will show a marked increase when the tonnage of flotation feed increases.

The new machine does away with the large settling basins formerly used at Hopewell. At some time in the future these will be reworked with the 150-foot hydroseparator to recover plus-150-mesh material.

Federal Legislation and Freight Rates Interest Stone Producers

another ON THE SPOT report

THE midyear meeting of the directors of the National Crushed Stone Association, held in the Hotel New Yorker, New York, on July 18, attracted 28 members of the board and a number of guests.

One of the board's first concerns was the proffered resignation of Henry E. Rodes, president of the Franklin Limestone Company of Nashville, Tennessee, who asked to be relieved of his duties as a member of the board. With expressions of deep regret, the directors decided to accept his resignation and, because of his long and faithful service to the association and the crushed-stone industry and of his having been at one time president of the organization, voted unanimously to make him an honorary member of the board. His son, A. B. Rodes, was chosen to succeed him as a director.

L. W. Shugg, for many years a member of the board representing the association's Manufacturer's Division, tendered his resignation because of his imminent retirement from the staff of the General Electric Company after 45 years of service. For a great number of years "Shuggie", as he is affectionately called by his many friends inside and outside the industry, acted as director of exhibits for the association's annual conventions and was responsible for the efficient arrangement and conduct of the expositions which, until the imposition of wartime government restrictions, were an important and attractive part of those gatherings. Association President G. A. Austin, who presided at the meeting, appointed Director Otho M. Graves to prepare a suitable scroll for presentation to Mr. Shugg as an expression of the board's high regard for the service he rendered the association and the industry throughout so long a period.

Engineering Director A. T. Goldbeck presented a detailed report of the principal activities of the association's technical staff during the first half of this year. On the subject of laboratory research, he told of a series of tests made, with the cooperation of the association's engineering department and others, by the Connecticut State Highway Department in the field of concrete research. The tests were undertaken in an effort to learn the behavior of trap rock and gravel in air-entrained concrete.

Mr. Goldbeck spoke also of tests made to determine the relative suitability of gravel and crushed stone for roads made of stabilized aggregates, having regard to their economic availability and the effect of their relative load-carrying abilities on the thickness of the pavement. The tests were made in the association's laboratory by a method and with equipment developed by Mr. Goldbeck some years ago.

Other tests dealt with the relative durability of dense and open mixtures, using both hard and soft asphalt. These tests involve the use of the circular track in one series and the use of bituminous-concrete cylinders subjected to static load in both a dry and a wet condition in the other. The results are inconclusive and additional tests must be made.

The engineering department is also investigating the effect of the time of drying on the specific gravity of coarse aggregate, because of the importance of specific gravity in calculating the proper proportioning of concrete.

Mr. Goldbeck presented the minutes of the first meeting of the association's Technical Advisory Committee, which the board had appointed to advise the organization on its technical work. The report of the meeting, submitted by J. E. Gray, the committee's secretary and the association's field engineer, revealed that the committee believed that producers should be made more conscious of the work the association can perform for them; that more emphasis might be placed on concrete-products research — concrete block, concrete pipe and cribbing; and that more effective distribution of information about the engineering department's accomplishments should be made.

Field Engineer Gray's report discussed the work done in the field by visiting producers and studying their problems. This work included a two-week trip through the South Atlantic states; a 5-week observation of tests of gravel and stone in concrete in New England; an inspection of 15 experimental surface-treatment sections of a test road in New York State using iron-ore tailings, crushed limestone and recrushed limestone in single and double treatments; a trip into a north-central state to investigate a problem involving the use of trap rock in concrete and proper proportioning; and numerous other activities.

J. R. Boyd, the association's administrative director, reviewed the present status of a number of subjects of interest to the crushed-stone industry. With reference to the construction outlook, he pointed out that monthly new construction has nearly doubled since the first of the year and reached $921,000,000 in June. The monthly rate of increase can hardly be expected to continue as long as construction materials are in short supply.

Public construction in June reached $169,000,000, which was 22 per cent. above the May figure but 19 per cent. below the June, 1945, total.

Privately-financed residential construction rose 8 per cent. from May to $324,000,000 in June and nearly 600 per cent. above the figure for June, 1945. Privately-financed nonresidential building, valued at $315,000,000 in June, increased 9 per cent. above May.

Highway construction in June, according to Mr. Boyd, was valued at $60,000,000, an increase of 25 per cent. over the total for May.

Mr. Boyd mentioned the Schroeder Case, in which the Supreme Court, on application by the employees of the E. C. Schroeder Company, declined to review the decision of the Circuit Court of Appeals for the Tenth Circuit, which had refused to extend the coverage of the Fair Labor Standards Act (the wage-hour law) to employees in the aggregates industry engaged in producing for "instrumentalities of commerce", such as highways, railways, etc. He reviewed the history of the case which arose out of an interpretive bulletin, issued by the Wage-Hour Administration on March 15, 1945, in which the administration's attitude on the coverage of employees engaged in the production of crushed stone was modified, because of the decisions in the so-called "ice cases," to extend the coverage of the act to employees engaged in producing for "instrumentalities of commerce". This bulletin appeared while a suit, brought by an employee and involving the principle of basic coverage of the act, was pending and may have had some effect in influencing the decision of the court in that case, for this decision held that the employees of the Schroeder company, who had

been engaged in quarrying crushed stone which was used in the building of a highway and a branch of a railroad, were covered by the provisions of the Fair Labor Standards Act. The Circuit Court of Appeals for the Tenth Circuit, to which the Schroeder company appealed, reversed the decision of the Federal District Court, and the decision of the Circuit Court was then submitted to the Supreme Court for review.

Although the Supreme Court has frequently said that the denial of a petition to review a lower-court opinion is not to be considered a judgment on its merits, Mr. Boyd pointed out that there is now a final decision, not subject to any further review, "holding squarely that the original position of the Wage-Hour Administrator was the correct one and refusing to accept his 1945 reversal of the previous interpretation". Mr. Boyd advised those present not to rely on this Supreme Court decision "to the extent of reverting to the practice of non-compliance with the Wage-Hour Act with respect to operations of this type". The Wage-Hour Administrator may attempt to get a contrary ruling in some other lower-court case for the purpose of insuring a review by the Supreme Court to resolve the resulting conflict.

With respect to the request of the railroads for an increase in freight rates of 20 cents a ton on crushed stone, sand, gravel, and blast-furnace slag and for the restoration of the rates previously suspended in Ex Parte 148, Mr. Boyd said that hearings in Ex Parte 162 will be held before the Interstate Commerce Commission on August 5 in Buffalo and Atlanta, and that a joint brief will be presented by the National Crushed Stone Association, the National Sand & Gravel Association and the National Slag Association. Meanwhile, the commission has authorized restoration of the suspended rates in Ex Parte 148, namely, an increase of 3 per cent. throughout the country with an additional increase of 5 per cent. in Official Classification Territory.

Mr. Boyd drew attention to the enactment of the Administrative Procedure Act (Public Law 404) which is designed to put into effect a simple and standardized form of administrative procedure to be followed by government agencies.

On the subject of price control Mr. Boyd said that progress in the efforts to obtain price decontrol had been made with respect to riprap, railroad ballast, fluxing stone, refractory dolomite, and stone used in the making of glass, which are no longer subject to price control. Mr. Boyd urged his hearers to hold the line on prices even though price control by the government may not be restored by the Congress at this session, because a reckless increasing of prices might result in the restoration of full price control by the session to be held after the autumn elections.

Mr. Boyd pointed out that the association now has 112 producer members—a decrease of 5, due principally to the consolidation of 5 members offsetting the acquisition of 2 new members, since the annual convention last January—and 69 associate members—a net increase of 3 in the same time.

Attention was called by Mr. Boyd to a bill which is pending in the Congress and which threatens a payroll tax of 17 per cent. on crushed-stone producers. He read the following telegram which he had sent to all members of the board:

"H. R. 1362 which passed House of Representatives and is pending in United States Senate will, if enacted in present form, extend coverage of compensation insurance for railroad employees to purely accessory industries furnishing materials for operation of railroads like railroad ballast. Bill calls for payroll tax of 17 per cent. Important you wire or call your two senators immediately, urging them to support amendments to bill making it unmistakably clear that it is not intended to include industries supplying materials for railroad operation. Please ask other members your area communicate with their senators."

The place and dates of the 1948 annual convention and exposition of the association were fixed by the board as the Netherland Plaza Hotel, Cincinnati, and January 25, 26 and 27, respectively. The 1949 convention, which will not include a show, will be held at the Hotel New Yorker, New York, on February 7, 8 and 9. No decision was made with respect to the 1947 midyear meeting of the board of directors.

The following directors and officers of the association were in attendance:

G. A. Austin, president and chairman of the board (Consolidated Quarries Corporation, Decatur, Georgia)
William M. Andrews (Union Limestone Company, New Castle, Pennsylvania)
J. R. Boyd (National Crushed Stone Association, Washington, D. C.)
H. H. Brandon (Melvin Stone Company, Melvin, Ohio)
James E. Bryan (Bryan-Monroe Company, Raleigh, North Carolina)
J. Reid Callanan (Callanan Road Improvement Company, South Bethlehem, New York)
W. N. Carter (National Stone Company, Joliet, Illinos)
T. C. Cooke (Lynn Sand & Stone Company, Swampscott, Massachusetts)
F. O. Earnshaw (Carbon Limestone Company) Youngstown, Ohio)
James Eells (Basic Refractories, Inc., Cleveland), representing the Agricultural Limestone Division
John C. Gall (Washington, D. C.)
A. T. Goldbeck (National Crushed Stone Association, Washington, D. C.)
Otho M. Graves (General Crushed Stone Company, Easton, Pennsylvania)
J. E. Gray (National Crushed Stone Association, Washington, D. C.)
R. G. L. Harstone (Canada Crushed Stone, Ltd., Hamilton, Ontario, Canada)
John C. Lauber (Trap Rock Company, Minneapolis)
Morris E. McLean (East St. Louis Stone Company, East St. Louis, Illinois)
V. C. Morgan (Kentucky Stone Company, Louisville)
Milo A. Nice (Hercules Powder Company, Wilmington, Delaware), representing the Manufacturers' Division
Russell S. Rarey (Marble Cliff Quarries Company, Columbus, Ohio)
W. R. Sanborn (Lehigh Stone Company, Kankakee, Illinois)
James Savage (Buffalo Crushed Stone Corporation, Buffalo)
F. W. Schmidt, Jr. (North Jersey Quarry Company, Morristown, New Jersey)
L. W. Shugg (General Electric Company, Schenectady, New York), representing the Manufacturers' Division
O. M. Stull (Liberty Limestone Corporation, Buchanan, Virginia)
J. B. Terbell (American Manganese Steel Company, New York), representing the Manufacturers' Division
Stirling Tomkins (New York Trap Rock Corporation, New York)
W. H. Wallace (Wallace Stone Company, Bay Port, Michigan)
Harold Williams (Washington, D. C.)
W. F. Wise (Southwest Stone Company, Dallas)
Albert L. Worthen (New Haven Trap Rock Company, New Haven, Connecticut)

The following guests were present:

Philip E. Heim (Carbon Limestone Company, Youngstown, Ohio)
S. P. Moore (Concrete Materials & Construction Company, Cedar Rapids, Iowa)
Stanley A. Phillips (PIT AND QUARRY, Chicago)
Nathan C. Rockwood (*Rock Products*, Chicago)
William A. Wilson (PIT AND QUARRY, New York)

Motor Maintenance

(*From page* 90)

are relatively small and the pressures produced in transmitting the loads are relatively large. It is essential to provide a film of lubricant of sufficient strength to withstand the localized pressure during the period of contact. The peripheral speed of the gears governs the period of tooth contact and determines the time during which the film must withstand the pressures. When speeds are high, the time is very short, the loads are usually light, and a comparatively light-bodied lubricating oil can be used. When speeds are low and the loads heavy, the contact time is considerably longer and a heavier-bodied oil should be used.

See that the oil level marked for each gearmotor unit is maintained. Drain the oil reservoir in the lower section of the gear case once a year and refill with new oil.

Proper maintenance, as outlined in the foregoing, is important even in normal times. In these times when new equipment is hard to get, the importance of an adequate maintenance program cannot be overstressed. Such a program will do much toward maintaining peak operating efficiency and making existing equipment last longer.

American Aggregates Installs Unique New Desanding Plant

By WILLIAM M. AVERY

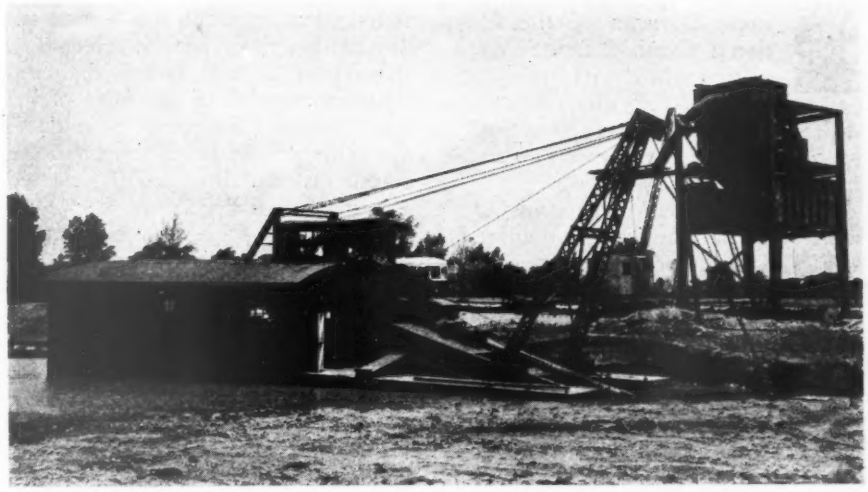
another ON THE SPOT report

THE American Aggregates Corporation, whose plant at Richmond, Indiana, was described in the February, 1946, issue of PIT AND QUARRY, has recently completed the installation of new equipment for a novel desanding operation to be carried on near the main plant at Richmond. The desanding plant has been designated as Plant B to distinguish it from the primary, or Plant A, setup. The two locations, which are several miles apart, have been connected by rail, and during the coming winter the company plans to develop 2,000 tons of raw storage capacity at Plant A in order to handle part of the output of the desanding operation. Half-inch material will also be shipped by railway to the company's Raymond Street plant at Indianapolis for reprocessing.

For the present, at least, the new plant will ship only pit-run gravel (with the sand removed) in order to supply the huge demand for coarse aggregates, but there is a possibility that the company may eventually install a pulverizing plant for making agricultural limestone. Preliminary investigations of the deposit indicate that the lime content of the material is sufficiently high for this purpose.

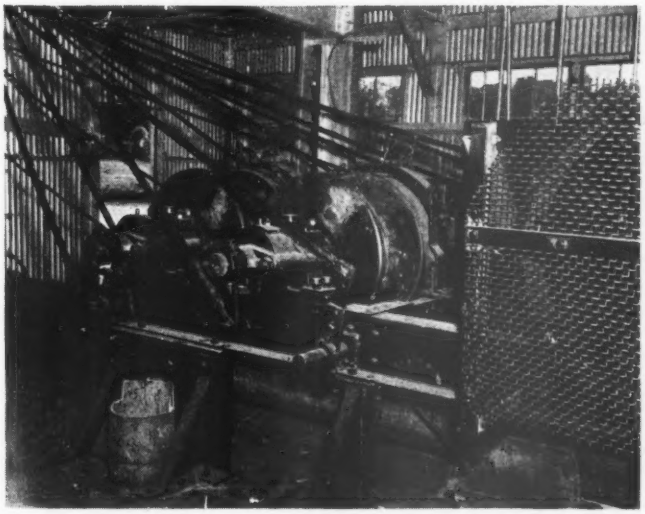
Recovery at the new site is effected by means of a 42-inch Amsco

(*Continued on page* 97)



A general view of the new desanding plant recently placed in operation by the American Aggregates Corporation near Richmond, Indiana. Screens and hopper may be seen at the right.

Above: The 12- to 18 inches of overburden covering the deposit has been stripped with this tractor-drawn 12-cubic-yard scraper.



Below, left: The dredge is maneuvered entirely with shore lines leading from this 5-drum hoist. Right: The 15-inch dredge pump is driven by a direct-connected 400-hp. induction motor.

Agricultural Limestone Producers Discuss Their Industry's Problems

another ON THE SPOT report

THE Agricultural Limestone Division of the National Crushed Stone Association held its midyear board-of-directors meeting at the Hotel New Yorker, New York, on July 19 with the division's chairman, S. P. Moore, presiding.

The first problem confronting the board was the resignation tendered by E. J. Krause (president of the Columbia Quarry Company, St. Louis, Missouri), who, because of continuing ill health, asked to be relieved of his duties as a director and a member of the executive committee. Although regretting the necessity for its action, the board decided to accept his resignation and to make him an honorary member of the board in recognition of his service to the association and its members and of his many years of activity in the interest of agricultural limestone producers, especially through his work as president of the Midwest Agricultural Limestone Institute, of which he is still the head. Mr. Krause's son, Horace C. Krause, was elected to succeed him as a member of the board and of the executive committee.

Henry A. Huschke, managing director of the division, presented a report in which he reviewed the promotional and field work of the division. He told of the wide distribution—over 200,000 copies—of the division's first promotional folder entitled *Repair and Rebuild with Limestone and Legumes,* and of the printing of another, *Agricultural Limestone, the Farmer's Friend,* which will soon be ready for mailing. He spoke also of the division's plan for stimulating newspaper advertising by agricultural-limestone producers and banks through the provision of mats, which are sold to division members and are given without charge to banks. Mr. Huschke's report was accompanied by a collection of excerpts from letters written to the division by banks and bankers' asssociations with reference to the advertisements prepared and distributed by the division.

Secretary-treasurer Boyd reported to the directors on the present status of the question of the liability of agricultural-limestone producers under the Fair Labor Standards Act, but as he made the same statement to the board of directors of the National Crushed Stone Association the day before, the reader is referred to the report of that body's deliberations on page 93 of this issue of PIT AND QUARRY. Reference is made to the same article for a report of his comments on the recently-enacted Administrative Procedure Act (Public Law 404); for a copy of the telegram he sent to board members regarding H. R. 1362, which, if passed, would impose a 17-per cent. payroll tax on the producers of such materials as railroad ballast; and for his remarks on the subject of price control by the O. P. A.

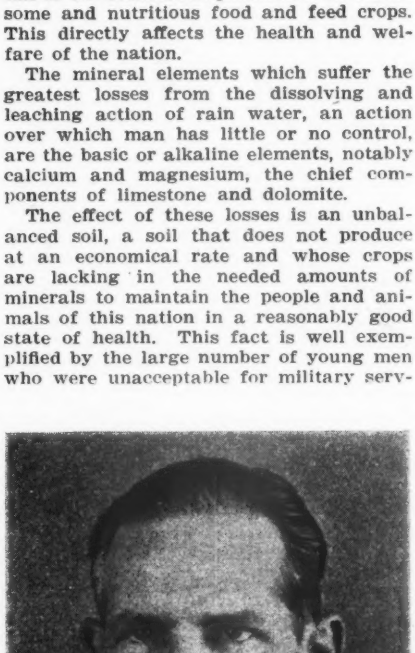
Philip E. Heim, chairman of the Policy Statement Committee, presented the following report:

STATEMENT OF POLICY

It is the inevitable result of farming in the humid areas of this nation that there are dissolved and leached out of the soil certain chemical elements that are essential to the economical production of wholesome and nutritious food and feed crops. This directly affects the health and welfare of the nation.

The mineral elements which suffer the greatest losses from the dissolving and leaching action of rain water, an action over which man has little or no control, are the basic or alkaline elements, notably calcium and magnesium, the chief components of limestone and dolomite.

The effect of these losses is an unbalanced soil, a soil that does not produce at an economical rate and whose crops are lacking in the needed amounts of minerals to maintain the people and animals of this nation in a reasonably good state of health. This fact is well exemplified by the large number of young men who were unacceptable for military service due to health defects, the figure running as high as 70 per cent. rejections in areas where the mineral content of the soil is very low.



Horace C. Krause

Technicians who are best informed on this subject, namely the agronomists and soil chemists of our state colleges and experiment stations have determined that over 50,000,000 tons of agricultural limestone is required annually to replace the yearly loss of calcium and magnesium and to keep our soils in a reasonable productive state. Our present rate of consumption is less than half that amount.

From the standpoint of a monetary investment it is highly profitable to apply agricultural limestone to the soil. However, a considerable period of time is required before the full return is realized. This fact makes the investment not too attractive even to many farmers who have the money available.

The problem of replacing the lost calcium and magnesium further is aggravated by the fact that about 40 per cent. of the farms in the United States are operated by tenants who, for the most part, do not have the interest in the future productivity of the land that an owner has and, therefore, do not invest in limestone.

Great strides have been made since 1938 through the programs of the Agricultural Adjustment Agency (now the Field Service Branch of the Production and Marketing Administration) toward solving the problem of getting back into our soils the calcium and magnesium that have been lost through cropping and leaching. But the task is only half done. It is to the interest of the entire citizenry of this nation that these efforts be continued and expanded.

Obviously, to attain the goal of 50,000,000 tons per year is no small job. It is one that will require for an indeterminate number of years the complete co-operation of government and industry. The fullest efforts of both are required to make farmers mindful of the necessity of more than doubling their soil-liming activities. This can not be done without the activating influence of the Conservation Materials Program of the Field Service Branch. Nor can it be done unless the farmers of this nation are convinced that their own welfare, as well as that of the nation, is at stake.

Therefore, in the light of the foregoing, it is the declared policy of the Agricultural Limestone Division of the National Crushed Stone Association that:

1. In the interest of the national welfare and the conservation of our soils, the Agricultural Limestone Division will actively and vigorously support a continuance of Federal aid to finance government programs designed to restore to an optimum level the calcium and magnesium content of our soils.

2. The Agricultural Limestone Division will continue to an even greater extent to assist in securing for the farmer and the nation as a whole, a well-balanced soil-conservation program. To this end the division purposes to consult, from time to time as may be appropriate and feasible, with the Federal, state and local agencies concerned.

3. Federal aid should be supported until this industry, through its own augmented efforts in merchandising, promoting and financing, is able to sell through the usual commercial channels the tonnage of agricultural limestone recommended by our well-informed agronomists and soil chemists.

For the foregoing purposes the division will work energetically and wholeheartedly.

The possibility and desirability of the division's making use of "sound-slide-films" in promoting the use of agricultural limestone were mentioned by Mr. Huschke, who said that such films, if available, would

undoubtedly be given hundreds of showings by the Agricultural Adjustment Administration (A. A. A.), the Extension Service and at Granges, 4-H clubs, and in vocational agricultural classes.

Mr. Huschke told about meetings which he had attended, either alone or with the division's secretary-treasurer, J. R. Boyd, in Ohio, Pennsylvania and Virginia, and expressed his belief in the great importance of field work. He referred to the division's having co-operated with the Office of Price Administration in the matter of amending RMPR 386, so that it could recognize approved wage and fuel-cost increases and reflect them in any price ceiling adjustment when they became effective.

This year, Mr. Huschke said, the division is co-operating with the National Lime Association in compiling statistics on the consumption of different kinds of liming materials on the farms in the various states.

In the board's discussion of the freight-rate situation and the brief to be filed with the Interstate Commerce Commission during its hearings at Buffalo on August 5, it was brought out that the rates effective in the past on agricultural limestone had been proposed and accepted by the railroads in an effort to encourage the use of that material and so increase the crop yields and the tonnage of farm products that would be moved by the railroads at high rates.

In answer to a question asked by one of the directors, it was disclosed that the Agricultural Limestone Division now has 163 active members —producers of agricultural limestone—and 23 associate members. According to Mr. Huschke, the 163 active members produce between 50 and 65 per cent. of the country's total agricultural-limestone output.

Chairman Moore presented an interesting piece of information when he said that it had been calculated that the use of agricultural limestone in the State of Iowa alone produced, in addition to the benefits to the farmer through increased output, a payroll of $1,500,000 for labor used in hauling and spreading the product and large expenditures for gasoline, oil, machinery and parts, amounting in the aggregate to more than $5,000,000 in one year.

It was decided to hold the 1948 convention of the Agricultural Limestone Division at the Netherland Plaza Hotel, Cincinnati, on January 29 and 30, immediately following the convention of the National Crushed Stone Association. The association's show would be continued through the week to enable those attending the division's convention to view the many interesting exhibits of machinery and equipment important in the production and application of agricultural limestone.

Arrangements for the division's 1947 convention, to be held at the Edgewater Beach Hotel, Chicago, on January 30 and 31, were placed in the hands of the following committee appointed by the chairman: S. P. Moore (chairman), Horace C. Krause, Harry A. Clark, Philip E. Heim and Otho M. Graves, who serves also on a similar committee of the National Crushed Stone Association.

The following directors and officers of the Agricultural Limestone Division were present:

Northeast Region

Harry E. Battin, Jr. (Callanan Road Improvement Company, South Bethlehem, New York)

East Central Region

S. B. Downing, Jr. (Central Rock Company, Lexington, Kentucky)
A. B. Rodes (Franklin Limestone Company, Nashville, Tennessee)
O. M. Stull (Liberty Limestone Corporation, Buchanan, Virginia)

North Central Region

Harry A. Clark (Consumers Company, Chicago)
James Eells (Basic Refractories, Inc., Cleveland)
E. E. Haapala (Zumbrota, Minnesota)
Philip E. Heim (Carbon Limestone Company, Youngstown, Ohio)
William E. Hewitt (East St. Louis Stone Company, East St. Louis, Illinois)
S. P. Moore, chairman (Concrete Materials & Construction Company, Cedar Rapids, Iowa)
Floyd W. Mumma (Columbia Quarry Company, St. Louis, Missouri)
R. M. Seifried (National Lime & Stone Company, Findlay, Ohio)

Southern Region

W. M. Palmer (Dixie Lime Products Company, Ocala, Florida)
E. V. Scott (Southwest Stone Company, Dallas)
C. M. Sims (Campbell Limestone Company, Gaffney, South Carolina)

Representing the National Crushed Stone Association

Otho M. Graves (General Crushed Stone Company, Easton, Pennsylvania)

Officers

J. R. Boyd, secretary-treasurer (Agricultural Limestone Division, Washington, D. C.)
Henry A. Huschke, managing director (Agricultural Limestone Division, Washington, D. C.)

American Aggregates

(*From page* 95)

cutter and a 15-inch Amsco pump, the latter driven by a 400-horsepower Allis-Chalmers induction motor. The all-steel dredge hull, which was shipped in sections from Indianapolis and assembled on the site, is 30 feet wide and 80 feet long. It has a draft of 5 feet. Good gravel has already been found in the deposit at a depth of 32 feet, and the company confidently anticipates working down to a depth of 50 feet, the extreme limit of the dredge. The dredge is handled entirely with 4 shore lines leading from a Greenville Manufacturing Works 5-drum hoist, the fifth drum being used to raise and lower the cutter frame.

The pit-run material, ranging up to 10 inches in size, is pumped directly to two shore-mounted 5- by 10-foot Allis-Chalmers Ripl-Flo vibrating screens. The screens, both of which are triple-deck machines, are mounted on a structural steel framework which straddles the railway siding. Minus-⅜-inch material is flumed back into the pond, while the remainder of the flow drops into a small, single-compartment hopper from which the cars are loaded.

The dredge was launched into a relatively small pond which had been excavated with a clamshell. From May 1 until the middle of June (when actual production began) the dredge was kept in continuous operation in order to enlarge and deepen the pond sufficiently to permit full-scale operations. The results obtained to date indicate that production will range between 150 and 200 tons per hour of plus-⅜-inch material. It is expected that

A closeup of the manganese steel cutter, which can reach to a depth of 50 feet below the surface.

from 1/3 to ½ of the total material pumped will be under ⅜-inch, all of which, according to present plans, will be flumed back into the pond behind the dredge. The screens and hopper will be moved periodically in order to keep the pump discharge lines as short as possible.

A considerable area adjacent to the present pond has been stripped in advance of the dredging operation. The overburden, ranging from 12 to 18 inches, was removed by a 12-cubic-yard Le Tourneau Model FP Carryall scraper drawn by a Caterpillar D-8 tractor.

Fred M. Lamb is manager of the two Richmond plants. Winford Rose, who operated a similar dredge for the company at Massillon, Ohio, for more than 20 years, is foreman of the desanding plant.

Pennsylvania Agricultural Limestone Division Holds First Annual Field Day

THE first Field Day of the Agricultural Limestone Division of the Pennsylvania Stone Producers Association was held on July 17 in the Dairy Building of the Pennsylvania State College. The presiding officer, Dr. H. K. Wilson, opened the meeting by introducing Dr. F. F. Lininger, who traced the development of the Pennsylvania State College, which was founded in the early 1850's.

Dr. Lininger explained that the Pennsylvania agricultural research school was made possible by the Hatch Act. Under this act, the Federal Government set up an experimental station in each state so that both Federal and state money is used to finance the research work. He said that research men are usually the "trail-blazers" for improved methods later used by the farmer, and that production per farm worker has increased materially. (Agricultural production has nearly doubled in the last 10-year period.) In closing, he remarked that for every Federal dollar appropriated, Pennsylvania State College had contributed $1.17, and that many other colleges are contributing $3.00 for each Federal dollar.

Following Dr. Lininger, J. W. White, professor of soil technology, gave a brief account of the experimental work which the agronomy department has done since 1861. In 1867 the Pennsylvania legislature passed an act requiring the college to purchase three tracts of land in Pennsylvania for experimental work in agriculture. This research work led to the establishment at State College of the Jordan Fertility Plots, which are the oldest experimental plots in the country. On these plots, tests have been conducted over a period of 60 years. The speaker stated that it was only fitting that these test data be made available to the liming materials producers. Test results presented are as follows:

First year, 100 per cent. with no liming material
Second year, 99 per cent. with no liming material
Third year, 87 per cent. with no liming material
Fourth year, 75 per cent. with no liming material
Fifth year, 61 per cent. with no liming material
Sixth year, 104 per cent. liming material added
Seventh year, 107 per cent. liming material added

J. B. R. Dickey, professor of agronomy extension, explained the function of the Agronomy Extension Department, adding that the most important part of the work is the preparation of information and making it available to the farmers in such a form as will best serve his needs. Professor Dickey said that he was not particularly interested in what type of liming material the farmer used, but felt that it was only proper to use the materials which produced the best results for the money invested.

He continued by saying that when liming materials are applied through present methods of tail-gate spreading, a poor job usually results. The most profitable place to put liming materials is on pasture land at frequent intervals. Dickey concluded by telling the group that at present potato growers are discussing the use of liming materials and are considering experiments in which soils treated with high calcium liming materials will be treated alternately with high magnesium liming materials.

Dr. Wilson introduced H. H. Wagner, secretary of the Agricultural Limestone Division, by announcing that Mr. Wagner and John Curtin, Sr., were largely responsible for making available the funds necessary to erect a new Agronomy Building on the Pennsylvania State College Campus, and that the Field Day was arranged by Mr. Wagner for the producers of agricultural liming materials and others interested in the subject.

Mr. Wagner told the group that he was impressed with the research program that was being prepared not only by Pennsylvania State College, but also at the neighboring state colleges. This research work, for the most part, is designed to determine by what method soils can be improved and maintained for maximum crop production. This impression was gained from a meeting of the National Lime Association which was held at State College. Near the close of this meeting the subject of nutritive values of foods grown on rich soils was given some small attention. Mr. Wagner declared that this subject could easily be one of the most important parts of a research program since the ultimate reason for growing crops is to feed the people. He quoted from a recent article by Dr. Henry C. Sherman of Columbia Univerity, who states that from experiments he has conducted for 40 years he finds that foods rating high in protective elements extend virility in a human being by 30 per cent. and longevity by an equal amount.

Dr. Lininger interrrupted the speaker at this time to state that such a program of research would be conducted by the Department of Agronomy.

There were sixty members and friends of the Agricultural Limestone Division present for the luncheon at State College Hotel. Dr. Lyman E. Jackson, dean of the School of Agriculture, spoke during the luncheon and outlined long-range plans being developed for the erection of plant facilities for the Department of Agronomy and Horticulture. He told the group that several weeks ago he had the pleasure of taking Messrs. Curtin and Wagner for a tour of inspection which covered most of the property at State College, at which time detailed plans were reviewed covering the general revamping of the facilities of the college.

The afternoon was devoted to an inspection of the Jordan Soil Fertility Plots, conducted by Dr. J. W. White and Dr. A. C. Risher. The crops, for the most part, were ready for harvesting, affording the group an excellent opportunity to study soils which had been farmed for more than 65 years. Some of these plots never had had an application of fertilizer, manure or liming material. Others had been treated with various types of fertilizer, without the addition of liming materials; and still other plots had been treated with both.

36, 228 Applications Approved by C.P.A.

The Civilian Production Administration stated that between March 26 and July 4 a total of 36,228 applications for commercial and industrial construction valued at $1,502,084,000 had been approved in the United States and 19,453 applications valued at $833,338,000 had been denied.

W. B. Jones, president of the Duquesne Slag Products Company, has announced that the general offices of the firm have been moved to 1519 Oliver Building, Pittsburgh 22.

Factors Affecting the Fuel Economy of Rotary Lime Kilns

By RALPH GIBBS
Consulting Chemical Engineer

A Consideration of Elements Contributing To Maximum Production

another P-Q exclusive

LIME manufacturers are becoming increasingly interested in the economies of their operations. And since the fuel cost generally is the highest single item of expense, considerable concern with this item is justified as offering an immediate and effective opportunity for cost betterment. This is especially true in rotary kiln plants where intelligent, and therefore more costly, manpower is essential properly to attend technically-controlled operations performed in costly equipment.

There are many factors, in any operation, that contribute to the fuel requirements for lime-burning in rotary kilns. Some are major and some are minor. All can be grouped under one single heading—*maximum production*. Any such operation, working at the highest production rate of which it is capable, will be doing so with a minimum of fuel. No doubt there are some who might contend this viewpoint. Experience, however, has shown it to be tenable.

Those factors primarily affecting the production rate of a rotary kiln burning lime are:

A. Balanced Combustion
B. Proper Kiln Loading
C. Heat Wasted

Of course, there are many minor items such as regularity of kiln operation, quality of fuel and feed, etc., all more or less uncontrollable, the usual hazards attending any processing operation. A, B, and C above are not chance items, however, and can be controlled very closely if some attention and interest is accorded them.

A. Balanced Combustion

Pulverized bituminous coal probably is more generally used than any other type of fuel, and in order to discuss specific illustrative examples later on, the use of a good grade of this kind of fuel is presumed. It will have a heating value of about 13,500 B.t.u. per pound and an ash content of 6-10 per cent.

The writer defines balanced combustion as the use of just sufficient fuel, properly burned, to develop a product of the desired qualities.

It will be noted that balanced combustion, as here defined, means not only closely regulating the proportion of air and fuel, but also adjusting and balancing either the heat available to the heat required, or the heat required to the heat available.

Proportioning Fuel and Air The effects of poorly proportioned fuel and air are not generally appreciated. Excessive quantities of air will lower the flame temperature by chilling, and a deficiency of air lowers the heat release of the fuel to the same end—a lower flame temperature. In the first instance, i.e. with excess air, the full heating value of the fuel is developed, but heat is utilized in raising the temperature of the surplus air which lowers the temperature of the flame. In the second instance, when there is a deficiency of air, a proportional amount of the carbon in the fuel burns to carbon monoxide instead of carbon dioxide, and for each pound of carbon so burned only 28 per cent. of its full heating value is realized.

Balancing Quantities of Heat Obviously the quantity of heat that can be supplied to the kiln system in unit time is limited only by the capacity of the devices supplying the fuel and air, and the physical size and arrangement of the kiln and auxiliary equipment. Just as obvious is the fact that to supply fuel at a greater rate than necessary to perform the required duty will result in a poorer economy of operation. Consequently some attempt is made to regulate either the rate of supplying the heat, or the heat requirement so as to maintain some sort of balance within practical limits.

At this very important point in the lime-burning operation we must rely almost entirely upon the experienced judgment and enterprise of the "burner" or kiln operator. A good kiln operator, by keen observation and intelligent interpretation of what he has seen, and provided with reasonable means of control, soon will have the operation nicely balanced. Of course a poor kiln operator just as easily can go the other way and have everything by-the-ears and upset in no time at all.

Some difficulty may be experienced in establishing the conditions which will dictate the best balance that must be maintained by the kiln operator. Different types of limestone or dolomite respond differently to treatment by heat, and no hard and fast rules can be set down along these lines. A further factor is the degree to which the material must be, or may be, burned without interfering with its marketability. Obviously, from the standpoint of fuel economy, it is advantageous to produce a material slightly underburned rather than overburned, since it seems the time and heat required to reduce the last few per cent. of volatile matter in the lime becomes increasingly disproportionate.

In any event, this quality of the product must be seriously considered and established so as to guide the kiln operator in the regulation of the burning practice that the least amount of fuel can be used and still produce a satisfactory product.

Fig. 1, 2 and 3 illustrate this extremely important point. Fig. 1 is an attempt to show the appearance of the material in the kiln at the hot zone. Through the cobalt glass the material has a dull red color, quite uniform throughout the entire hot

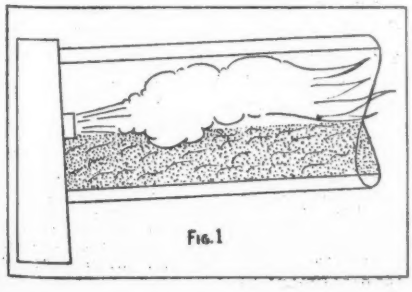


Fig. 1

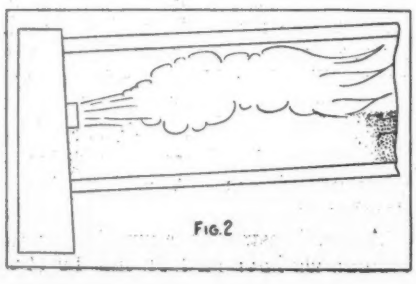


Fig. 2

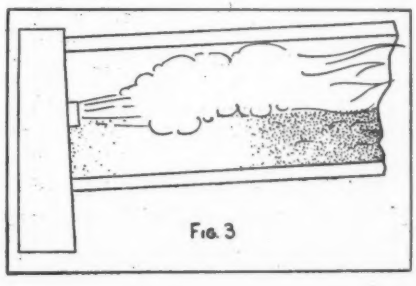


Fig. 3

zone, and fumes are seen coming from the surface. This condition generally represents an underburned product. In Fig. 2 the dark and fuming appearance of the material flashes, within a short distance, to incandescence at the far end of the hot zone. This condition generally results in a product that is overburned. Fig. 3 is a condition somewhere between those shown in Fig. 1 and 2 and one which usually enables a satisfactory lime to be made. It is readily appreciated that conditions as shown in Fig. 1 result in a waste of fuel in that the product will not be satisfactory, Fig. 2 will result in a waste of fuel because more heat than necessary is applied, and a condition somewhere between these limits will be found to be the optimum.

B. Proper Kiln Loading

There seems to be no established method for determining the proper load that should be carried in the rotary kiln. By the word "load" the writer means the quantity of material retained in the kiln under process and, in this discussion, will be measured by the greatest thickness of the bed, radially from the centerline of the kiln.

The load that will be carried or held in the kiln will, when means for retention are provided, depend upon the rate of travel of the material through the kiln and the rate of feed to the kiln.

For an unobstructed kiln the time of travel of the material has been empirically established by the relation*:

$$(1)\quad T(\text{minutes}) = \frac{1.77\, L\sqrt{\theta}}{P\, D\, N}$$

where T = Time, in minutes, required to pass through L
L = Kiln length in feet
θ = Angle of repose of the load material, approximately 45° for crushed stone
P = Pitch, or slope or inclination of the kiln in degrees. ½" per foot is 2.39°
D = Diameter inside kiln lining, feet
N = Kiln turns, rpm.

By rearranging (1), the time-rate of travel will be:

$$(2)\quad R_t = \frac{P\, D\, N}{1.77\sqrt{\theta}} = \text{feet per minute.}$$

In this relation it is to be noted that the *quantity* of material in the kiln, or the degree of loading, has no measurable influence on the time, or the time-rate, of travel. In other words, all other factors remaining constant, the material will travel through the kiln in the same time, or at the same time-rate, whether the depth of the load is 10 inches or 20 inches.

This highly significant feature is of the greatest practical importance since it enables a fixed load to be carried in the kiln within any reasonable r.p.m. It is necessary only to link the kiln-feeding arrangement

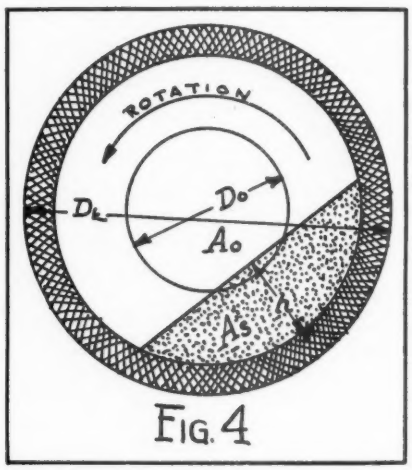


FIG. 4

with the kiln-turns so that a change in the latter will proportionately change the former.

It is believed the benefits of maintaining a constant load in the kiln now are generally recognized. It is true that means for controlling the requirement for heat as well as the supply of heat is highly desirable and necessary. It is rash, however, to impose more than the barest necessities for this purpose since too many variables become confusing and unmanageable. In any event there are, we see, very simple and effective methods for maintaining the proper kiln loading constant once it has been established. It is to the fixing of this factor that our attention now is directed.

Graphic Method This method is about as good as any that might be used in establishing the optimum loading of the kiln, and the diameter of the opening inside the retaining dam at the feed end. Its development is based first on the fact that, with constant draft at the feed end, the capacity to burn the fuel properly is controlled by the free area of the opening in the retaining dam, and second that, at constant r.p.m., the cross-sectional area of the load-segment is a measure of the heat requirement. In practice it has been determined that, with a draft of .25 in. WC, each square foot of opening inside the dam will allow 250 pounds of coal per hour to be burned properly. This area is shown as A_o in Fig. 4 while the cross-sectional area of the load-segment is shown as A_s with the load-depth as h.

As an illustrative example, let us assume we have an 8-ft. dia. by 125-ft. long kiln burning good quality lime from high grade limestone chips (+¼—1-in.). Combustion is balanced and draft is constant at .25 in. WC. A fuel requirement of 600 pounds of good-quality bituminous coal is anticipated. The kiln is lined with 6-in. blocks and the r.p.m. is constant. The retaining dam in the feed end is 12 in. high. The kiln is not obstructed (no dams or rings). A production rate of 5 tons/hour of lime is to be realized. What will be the proper height of the retarding dam and the corresponding depth of the load?

The first thing to do is calculate the area features of the system. The results of such a computation are shown in Table I.

TABLE I
Areas of A_o and A_s for 8-ft. Diameter Kiln, with 7-ft. Diameter Inside the Lining, for Different Values of h.

h feet	D_o feet	A_o sq feet	As sq. feet
2'0"	3'0"	7.07	9.18
1'6"	4'0"	12.57	6.04
1'0"	5'0"	19.64	3.38
0'6"	6'0"	28.27	1.21

Next, the values of A_o are multiplied by 250 lb. in order to determine the coal-burning capacity of the systems. The values of A_s are multiplied by 888* to give us the fuel requirements of the systems. Thus table II is developed.

TABLE II
Fuel Rates of the Systems. lb./hr.

h	Available	Required
2'0"	1765	8150
1'6"	3140	5360
1'0"	4910	3000
0'6"	7070	1075

Computed Method This method, more involved than the graphic method, also may be used; but it serves to check the graphic method.

It will be necessary to point out some little-known and seemingly irrelevant facts, as follows:

(a) From personal observations it appears the load in the kiln absorbs heat, during its entire passage, at a fairly constant rate. Thus the time required to preheat the stone and the time required to calcine the stone are in proportion to the heat requirements of these steps, and the time of travel through the kiln can

*Government Publication, Bureau of Mines Bulletin, now out of print.

*The derivation of this figure is as follows:
From the data given, the hourly fuel consumption will be 600 × 5.0 or 3000 pounds of coal per hour. With h equal to 12 in., the load-segment area is 3.38 sq. ft., so the fuel requirement is 3000/3.38 or 888 lb. coal/hr./sq. ft. of load-segment area.

be apportioned to preheating and to calcining.

To explain this further, the burning of lime is not a single process, but rather two processes. The first consists of heating the limestone to approximately 1650 deg. F. (preheating) and the second consists of supplying heat to dissociate the lime and carbon dioxide at some temperature above 1650 deg. F.

The specific heat of limestone is about .25 so that in raising the temperature of 1 lb. of stone from 70 deg. F. to 1650 deg. F. the heat required to do this is:

$$(1650°\text{F.} - 70°\text{F.}) \times .25 \times 1.0 = 395 \text{ B.t.u.}$$

The heat of dissociation of calcium carbonate to carbon dioxide and calcium oxide at atmospheric pressure is 748 B.t.u. per pound of calcium carbonate.

Thus the total heat required to preheat and calcine one pound of pure limestone is:

395 B.t.u. + 748 B.t.u. = 1143 B.t.u.

so 34.5 per cent. of this heat requirement is devoted to preheating and 65.5 per cent. to dissociation. And in the kiln itself we can look for about one-third the traveling time occupied in preheating and two-thirds in calcining. And since the rate of travel through the kiln is fairly constant, we can expect one-third of the length of the kiln occupied with preheating and two-thirds with actual calcining.

(b) Although temperatures as high as 2600 deg. F. may be attained in the hottest zone of the kiln, the mean effective temperature of calcination (average surface temperature of the calcining lime particles throughout the calcining zone) is approximately 1800 deg. F.

(c) The rate of penetration of the actively calcining surface into the limestone particles is .000026 in. per minute per degree temperature difference between the core and the mean effective temperature.

(d) In good lime burning practice, the relation:

$$Q_d = \frac{k\ D^2\ L}{100}$$

can be attained, in which

Q_d is the optimum production rate, tons lime/day

D is the kiln shell diameter, feet

L is the kiln shell length, feet

k is the production coefficient, about 1.5.

(e) The time of travel of the material through an unobstructed kiln is given in relation (1).

(f) The lime produced weighs 50 pounds/cu.ft.

Let us assume we are dealing with the same kiln used in the previous illustrative example, with the further stipulation that it has an incli-

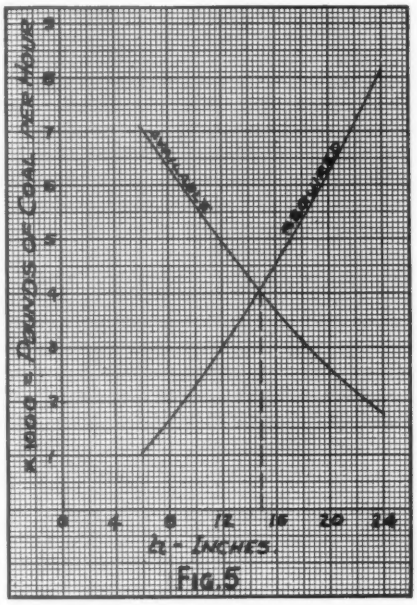


FIG. 5

nation or slope of ½ in. per foot, and that it is turning at 0.5 r.p.m.

From the relations given in (1) we can solve for T_m as follows:

$$T_m = \frac{1.77 \times 125 \times \sqrt{45}}{2.39 \times 7 \times .5} = 178 \text{ min.}$$

Since 65.5 per cent. of this time is spent in the calcining effort (a) then .655 × 178 = 116.5 minutes are allowed for calcination.

We can check this by means of (c) when:

$$.000026'' \times (1800°\text{F.} - 1650°\text{F.}) \times T_c = .45''*$$

Solving this relation for T_c, we have:

$$T_c = \frac{.45}{.0039} = 116 \text{ minutes}$$

and the check is found to be remarkably close, and the time allowed for calcination equals the time required for calcination.

From (d) a production rate of:

$$Q_d = \frac{1.5 \times 8^2 \times 125}{100} = 120 \text{ tons/day} = 167 \text{ lb./min}$$

can be expected.

From (f) and the weight delivered from the kiln per minute

$$\frac{167}{50} = 3.34 \text{ cubic feet of lime per minute}$$

is delivered.

Since it requires 178 minutes for a particle of the load material to travel through the kiln, the time-rate of travel is

$$\frac{125}{178} = .704 \text{ feet per minute, and}$$

$$\frac{3.34}{.704} = 4.75 \text{ square feet must be}$$

the cross sectional area of the load-segment A_s. From this, the height of the segment or the load depth and also the dam height h is found to be about 15¼ inches. Thus the graphic method is checked.

Since such kilns are intentionally, and sometimes unintentionally, obstructed in practice and so retard the time-rate of travel of the material through the kiln, it is well to add at least 20 per cent. to the above derived figure to make it practical. Thus, in this case, an 18-inch dam at the feed end will make it about right.

With this 18-inch dam, the opening in the feed end of the kiln will be 4 ft. 0 in. in diameter and will have an area of 12.57 sq. ft. Then 250 # coal/hr/sq. ft. × 12.57 sq. ft. = 3140 pounds coal/hr., and

$$\frac{3140 \text{ \# coal/hr.}}{5 \text{ tons lime/hr.}} = 628 \text{ \# coal/ton}$$

lime. This is a safe figure and generally can be attained.

It seems that the only limitations to the loading of a kiln are the capacity to burn the fuel properly and the structural strength of the kiln and foundations. An excellent field for worthwhile practical experimenting and investigation here is wide open for those who have the audacity—and funds—to do it. Without a doubt our kilns can be more heavily loaded than is general practice today, and to advantage in fuel costs.

C. Heat Wasted

It does not seem to be generally appreciated that the usual rotary kiln lime-burning operation requires from 8,000,000 to 10,000,000 B.t.u. to produce a ton of lime when the

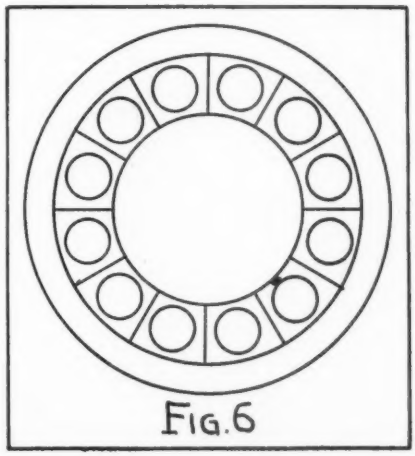


FIG. 6

*— T_c is the time required for calcining a particle of limestone that just passes through a 1-in. screen (square) having its smallest dimension something less than 1 in., so that .45 in. has been assumed as half this dimension. 1650° F. is the temperature of the core of the particle and 1800° F. is the mean effective temperature (b).

actual requirement of the material itself is not over 4,500,000 B.t.u. Consequently the average lime-burning rotary kiln operation at best doesn't have much better than a 50 per cent. thermal efficiency. And if all the energy required by the whole process is considered, it is doubtful that the overall efficiency would exceed 30 per cent.

However, considering only the apparent thermal efficiency, there are three major items that contribute to this extravagant waste of heat. They are:

Heat lost in discharged lime;
Heat lost through kiln shell;
Heat lost in hot exit kiln gases.

These will be discussed separately.

Heat Lost in Discharged Lime The heat lost in the discharged lime is easily computed by

$h_1 = .25 \times (T_{d1} - 70°F.) \times 2000$

in which h_1 is the heat lost in each ton of lime, B.t.u./ton. T_{d1} is the temperature of the discharged lime.

Since the lime normally is discharged from the kiln at about 2100°F., h_1 will be about 800,000 B.t.u. By the use of conventional coolers, up to 50 per cent of this heat may be recovered by preheating air for the fuel-burning process. A 50 per cent. recovery of this heat is equivalent to about 30 pounds of coal per ton of lime produced. The development of a truly efficient lime-cooler is awaited by the lime industry with the greatest interest. Possibly, with a little encouragement, this might be accomplished.

Kiln Shell Heat Loss The kiln shell heat loss depends entirely upon the provisions made, by way of properly applied heat insulation and adequate kiln linings, to prevent the escape of heat through the walls of the kiln.

Heat Lost in Exit Kiln Gases By far the largest portion of the heat wasted is accounted for in the hot exit kiln gases. In another article* the writer presented a relation for computing the quantities of gases issuing from rotary kilns as:

$$(3)\left(\frac{2000}{.58} - 2000\right) + (f_r \times 2000 \times 10) + (f_r \times 2000 \times .94) =$$

the total weight in lb. of exit kiln gases per ton of lime produced under conditions of balanced combustion. f_r is the fuel-lime ratio, expressed as pounds of fuel per pound of lime produced.

*Chemical & Metallurgical Engineering, April 1944, p. 106.

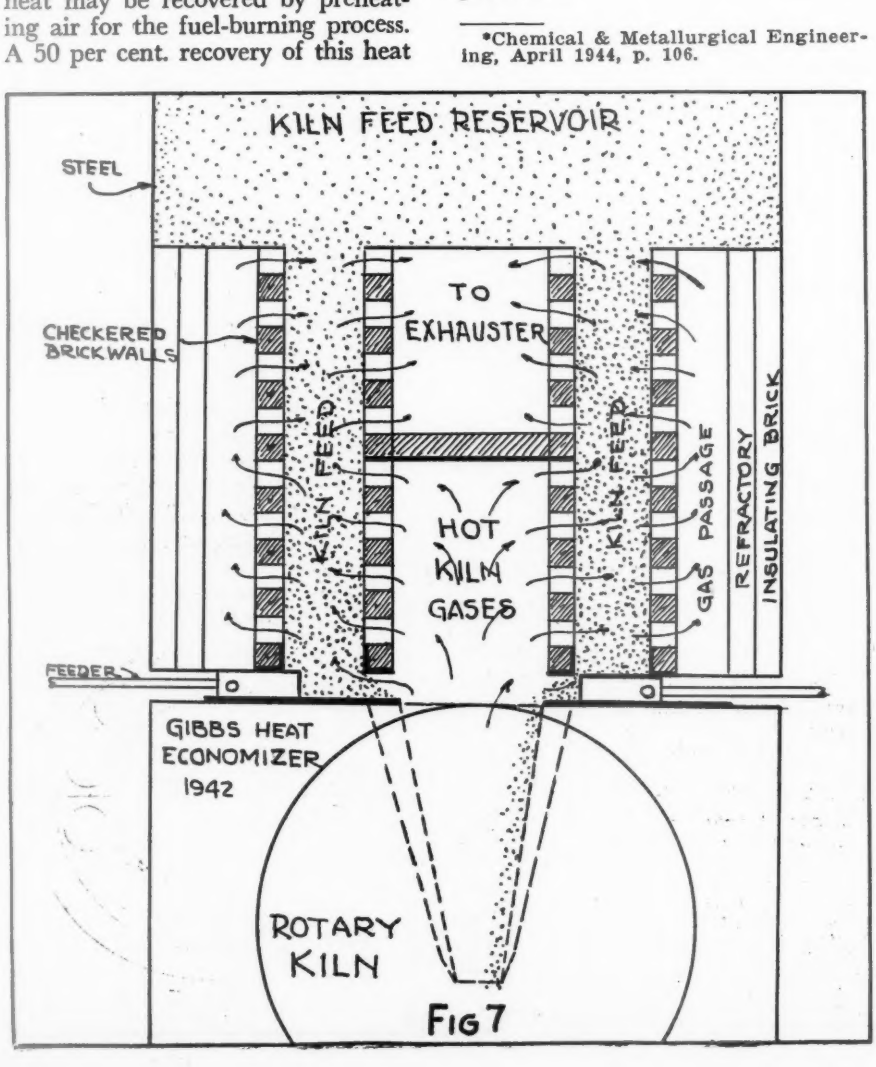


FIG 7

The table below shows results for various fuel-lime ratios.

TABLE III

f_r	lb. Gases/ Ton Lime	Heat Lost Above 70° F. With Exit Gases at 1500° F. B.t.u.
.715	17,095	6,100,000
.500	12,390	4,440,000
.333	8,744	3,130,000
.250	6,920	2,480,000
.200	5,826	2,080,000
.167	5,096	1,820,000

Although considerable effort and money has been expended in developing contrivances to recover this wasted heat, none has been universally accepted. One unique arrangement is the use of kiln blocks extending well into the kiln, and in which are holes that carry a portion of the load around the inside periphery of the kiln. This is shown in Fig. 6. This is effective in lowering the temperature of the exit kiln gases—but the blocks soon break out and their installation cannot be considered at all permanent.

Another arrangement that has been successful to a limited extent consists of a reservoir of the kiln feed in which heat-resistant-iron louvres allow a portion of the hot kiln gases to pass through the bed of stone before it is fed to the kiln. It is a very costly installation.

Still another device consisted of installing in the stack of the kiln a spiral chute or trough through which the kiln-feed was passed before it was introduced into the kiln.

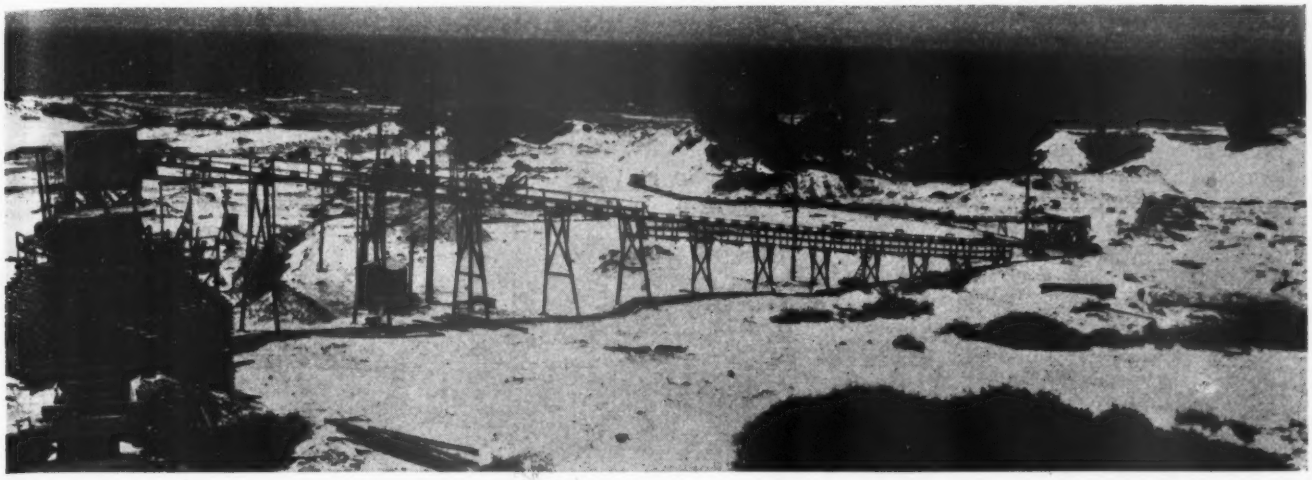
With the objective in mind for eliminating costly construction, and incorporating simplicity and the effectiveness of counterflow, the writer has designed the arrangement shown in Fig. 7. It is rectangular in plan section and consists almost entirely of suitable 9 inch straight bricks and can be built with the facilities ordinarily available to a lime or refractory dolomite plant. It will be noted that the hot kiln gases pass first one way and then the other through columns of the stone-feed on its way to the kiln. A minimum of costly heat-resistant alloy iron is required. Exit-kiln-gas temperatures as low as 300°F. are anticipated. Ordinarily this type of economizer should affect a fuel saving equivalent to 150 pounds of coal per ton of lime.

Summary

It is not difficult to summarize the gist of this paper. By maintaining balanced combustion, full kiln loading and reducing as far as possible the wastage of heat, the maximum production possibilities of the kiln will be realized and the best possible fuel economy will result.

California Silica Sand Plant Operating On Scenic Beach Site

By HARRY F. UTLEY



A view of the Del Monte Properties Company's plant on the Monterey Peninsula of California, showing field conveyors, sand deposit and the sea.

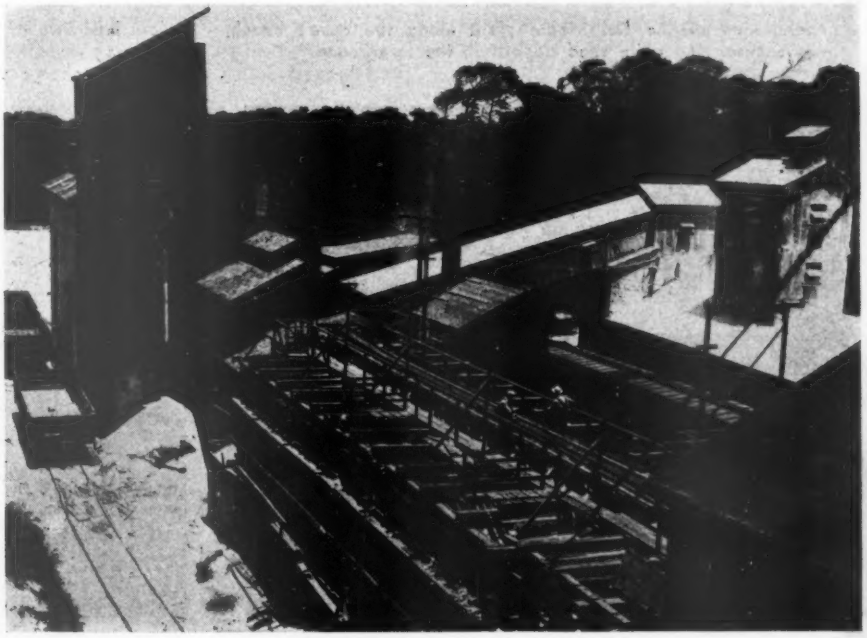
another ON THE SPOT report

FOR more than a quarter of a century the dazzling white sands above Moss Beach on the historical and beautiful Monterey Peninsula in California have supplied the needs of many western industries which required high grade silica sand. Until about 25 years ago the sand was not processed, being loaded by hand into wheelbarrows which filled a waiting string of cars on a railroad spur. The raw sand was used almost exclusively by the foundry industry and as a basic ingredient of plaster.

In 1920, the Del Monte Properties Company built its first washing-and-screening unit on the site. Six or seven years later it installed grinding equipment, and improvements added in succeeding years have brought the plant up to its present efficiency where it is now turning out 14 or 15 different products. Monthly shipments, practically all made by railroad, now average about 15,000 tons with a large share of the output packaged in paper.

The deposit consists of wind-blown dunes about one mile in length, skirting the Pacific Ocean, and extending about one-fourth mile inland. The area at one time included a small, land-locked body of water known as Lake Majella, long since dried up. In contrast to many commercial silica-sand deposits, the grains, worn and rounded by wave and wind action, are not cemented together but are a true sand analyzing about 80 per cent. pure silica, with an iron content of .10 to .12 per cent. No stripping is necessary, two P & H gasoline-powered shovels with ½-cubic yard dippers loading the raw sand onto the field conveyors *via* small hoppers which straddle the belts. The field conveyors are sectional and easily shifted to a new loading position. They are equipped with 14-inch belting and have a combined length of 1,500 feet. They discharge to a central surge pile above an 80-foot concrete tunnel from which a 14-inch by 300-foot belt reclaims the sand, carrying it up to a tower where a 3- by 5-foot Overstrom single-deck vibrating screen fitted with 16-mesh cloth removes vegetation and any coarse objects or particles.

Below: The sign at the entrance to the plant from Seventeen-Mile Drive. Right: A view of the plant showing the conveyor above draining bins (foreground), screening and magnetic separating houses beyond and concrete silos alongside gondola cars. The grinding plant is at the right.

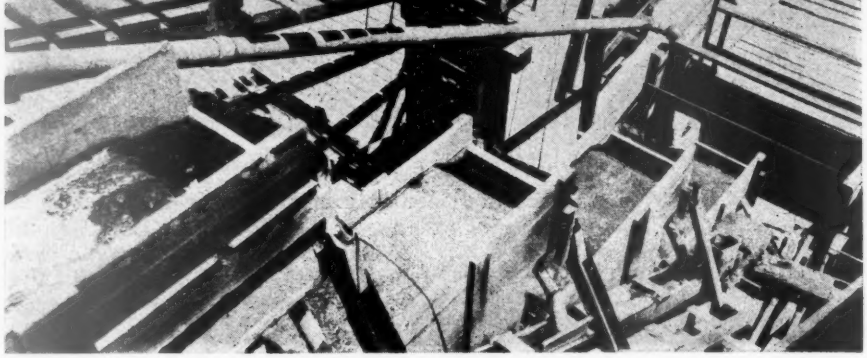


After it leaves the screen the sand is washed successively in a series of four hindered settling tanks, each at a lower level than the one above it, the fine vegetation being floated off to waste while the finest sand particles pass to a dewatering box. This box discharges to open storage to yield the first commercial product, core sand for the foundry trade. The wet sand from the settling tanks passes to five 18- by 6-foot Overstrom diagonal-deck concentrating tables which remove most of the heavy minerals such as iron, garnet, and hornblende. Sand passing over the tables is pumped to two Dorr rake-type classifiers, the products of the classifiers passing to the plant draining bins by way of a horizontal belt-conveyor above the bins. Discharge to the selected bin section is accomplished by a tripper.

The draining bins have a total capacity of 800 tons, and the sand remains in the bins for a 24-hour period, being withdrawn after that time in a semi-dry state through gates in the bin bottoms to a belt conveyor which carries it to a steam-coil drier. When completely dried, the sand passes through a screen, which forms the bottom of the drier, onto a belt conveyor which feeds the boots of two elevators leading to the main tower. A gas-fired 5- by 16-foot rotary drier operates as an auxiliary drying unit, augmenting the steam-coil drier to provide added drying capacity.

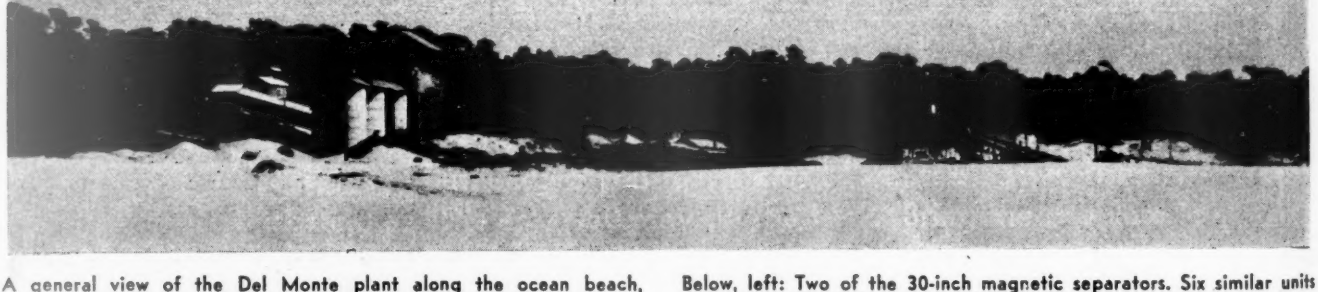
Three 3- by 6-foot single-deck vibrating screens—2 Tyler Hum-mers and 1 Overstrom — accomplish the sizing. The mesh on the Overstrom

(*Continued on page* 107)



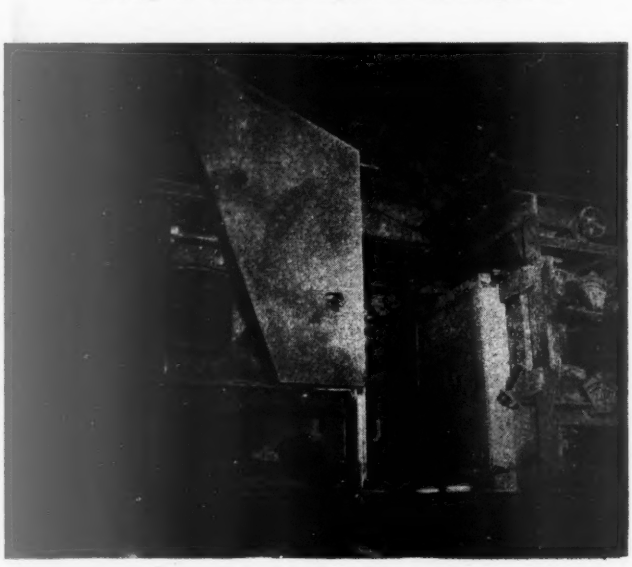
Four hindered settling tanks in step-like arrangement do the preliminary cleaning of the sand.

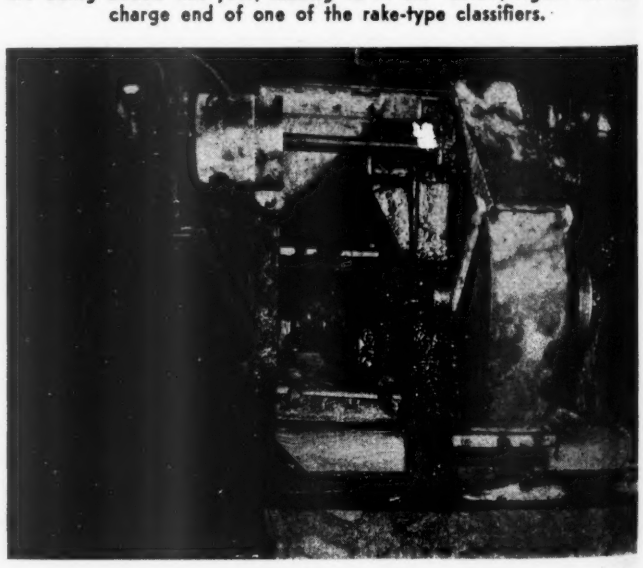
All grinding is accomplished in this 8-foot pebble mill. Silex pebbles and liners are used. Before the war Danish pebbles were employed as the grinding media.



A general view of the Del Monte plant along the ocean beach, showing the white sand deposit in the foreground.

Below, left: Two of the 30-inch magnetic separators. Six similar units are being added this year, making 12 in all. Below, right: The discharge end of one of the rake-type classifiers.





How Strategic Iran Desert Highway Was Built for Wartime Transport

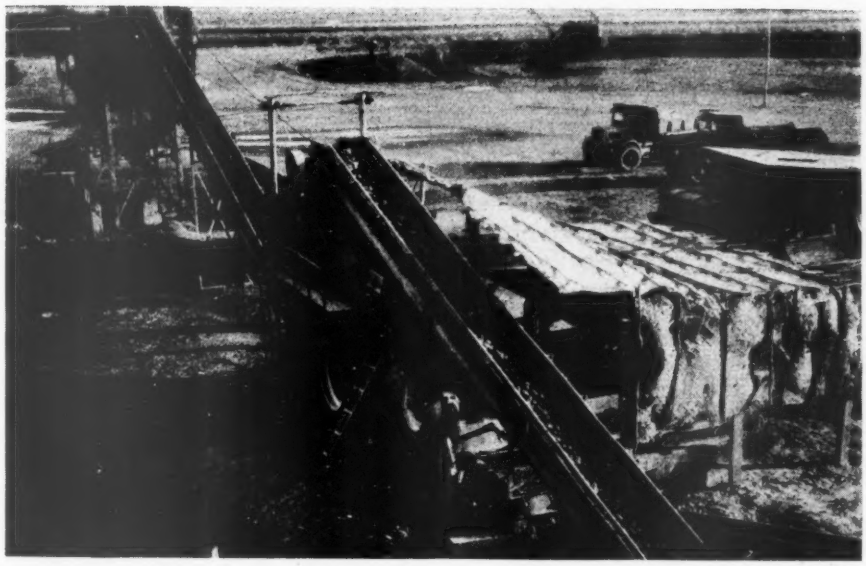
By CAPTAIN MARION C. RITTER
Corps of Engineers, U. S. Army

THE old Kingdom of Persia, known as Iran, is the strategic crossroads of the Middle East. Across its deserts and mountains run the roads that served as the "life-line" to Russia. The Iran Highway was the long road, but the safe one, over which the vital supplies were carried that enabled the Russians to push back the German armies and bring about their defeat. Without this highway, the outcome of the war might have been materially affected.

The port of Khorramshahr, on the Persian Gulf, is 14,000 miles from New York City. At this port, supplies from the United States were either transferred from ships to the railroad for an 860-mile trip to the Caspian Sea or were loaded into trucks and hauled over the Iran Highway to supply dumps in northern Iran or to Tabriz, the point where the trucks received their final checkup and were turned over to the Russians. Over 5,000,000 tons of supplies passed through the Persian Gulf Command to the U.S.S.R. in the 2½ years before it ceased activities on June 1, 1945.

The Foley Brothers Engineering Company started construction of the highway in June 1942; the American Army Engineers moved in and took over the Foley Brothers work in December of the same year.

In the construction and maintenance of the Iran Highway, many problems were involved and many of them in the Gulf and Desert Districts were solved by the trial and error method. From the Port to the city of Ahwaz, about 70 miles away, the road was built over desert mud flats which for about nine months out of the year was a hot desert with continuous sand and dust storms and for the other three months was constantly flooded.

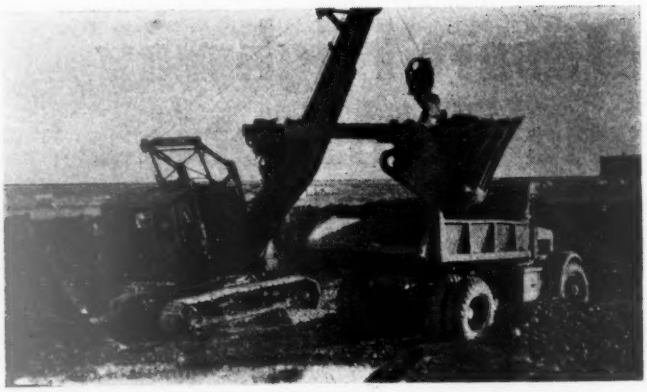


The 75-ton plant in operation. Reed shelter on the right protects motors from the hot sun.

This area was so flat that when it rained, high winds would push the water for miles across the country and form a gigantic lake which would wash out roads and railroads. This happened in February, 1943, so the army engineers rebuilt the damaged sections and built dikes across the desert to help divert the water.

After the road was brought up to grade, a 3-inch by 24-foot asphalt mat was laid on the road and this was topped with crushed rock. The first time this mat was laid the asphalt (MC2) and soil was mixed in windrows on the road with graders and when the mat was laid, water was sprinkled on the material and then rolled with pneumatic rollers. Under traffic, sections of this road began to powder. These sections were torn up and the second time more oil was used and the water mixture was eliminated altogether; this proved to be more satisfactory. Two methods were used in mixing this material. One was opening a windrow of soil with a grader and applying the oil with an asphalt distributor, then mixing by blading the material back and forth across the road with graders. The other method was mixing the material with a Woods mixer. This machine was pulled by a Caterpillar D8 tractor.

View of 75-ton plant used on the Iran Highway project.



A 2-cubic-yard shovel and a 5-cubic-yard truck supply the 75-ton crusher plant.

It straddled the windrow of soil and behind the mixer was a trailer distributor which fed the asphalt into the mixer. This machine did an excellent job of mixing but was rather a slow process. Our asphalt was shipped by barge from the Abadan refinery to Khorramshahr, a distance of about 7 miles; there it was pumped from the barges to 10,000-gallon railroad tank cars and shipped to a station near the road. To haul the asphalt from the railheads we used 2,000-gallon booster trucks and a 10,000-gallon tank mounted on a trailer which was pulled by a Mack truck.

After the asphalt mat was laid and the seal coat of asphalt applied, sand was applied to the road to keep it from bleeding during the heat of the day. Traffic was allowed over the road for a few days before the pea gravel topping was applied. This crushed rock topping was the only way a wearing surface could be maintained that would withstand the abuse of the continuous string of heavily-laden Russian-bound convoys. Had it not been for crushed rock, this desert road would not have been possible. There was no gravel available in this desert section so it was all shipped from the crushers which were located about 190 miles up the road from the Port near the city of Andimeshk. These gravel pits were located about 3 miles from the old Bible city of Dizful which is on the banks of the Diz river and in the foothills of the mountains. In this area was an unlimited supply of gravel with hardly any overburden to be removed. Our native labor at the pits came from the nearby village of Saba-Ab so our pits were known as the Saba-Ab pits. Saba-Ab is the Persian word for Green Water.

Our crushing equipment, in our opinion, was excellent. Our main crusher, which we used for crushing the material which was shipped out by rail, was a 75-ton Cedarapids crusher made by the Iowa Manufacturing Company in Cedar Rapids, Iowa. This plant was a "Morok" with apron feeder, tandem primary with Caterpillar power unit; secondary unit, 10- by 36-inch crusher with a Caterpillar power unit; a 40- by 24-inch roll crusher with a Caterpillar power unit; and a 2-compartment, 60-ton bin. A 50-kw. Cummins Diesel generator furnished the power to run the motors which operated the shakers.

This article, written by the Army Engineer Officer in charge of aggregates production for the vital Iran Highway, describes the adverse conditions under which this work had to be done. The successful carrying out of this project is a tribute to the ability of United States men and equipment to get a job done under climatic conditions worse than those in even our most desolate desert areas. —The Editor.

A high ramp was constructed so we could feed the plant by dumping the material into the hopper with dump trucks; these were loaded at the pit with a 2-cubic-yard Northwest shovel. The amount of material available was unlimited and ran from sand to rock about the size of a football.

On the average, the material from the plant ran about 60 per cent. crushed gravel and about 40 per cent. sand or tailings. The crushed gravel was used for topping the highway and the sand was used for construction purposes and also to spread on the road when sections of the road would be bleeding on hot days.

At this pit we also had a 10- by 36-inch Cedarapids jaw crusher with a bucket elevator to carry the crushed material to a rotary screen which was over a 3-compartment, 30-ton bin. This plant was used primarily as a sand plant to furnish fine sand for railroad engines going through the mountains. The material was hauled from sand deposits in dry river beds and was stockpiled at the plant and fed into it with a clamshell. The gravel screened out by this plant was also used as road topping and the larger rock was used at convoy stop stations as hardstands.

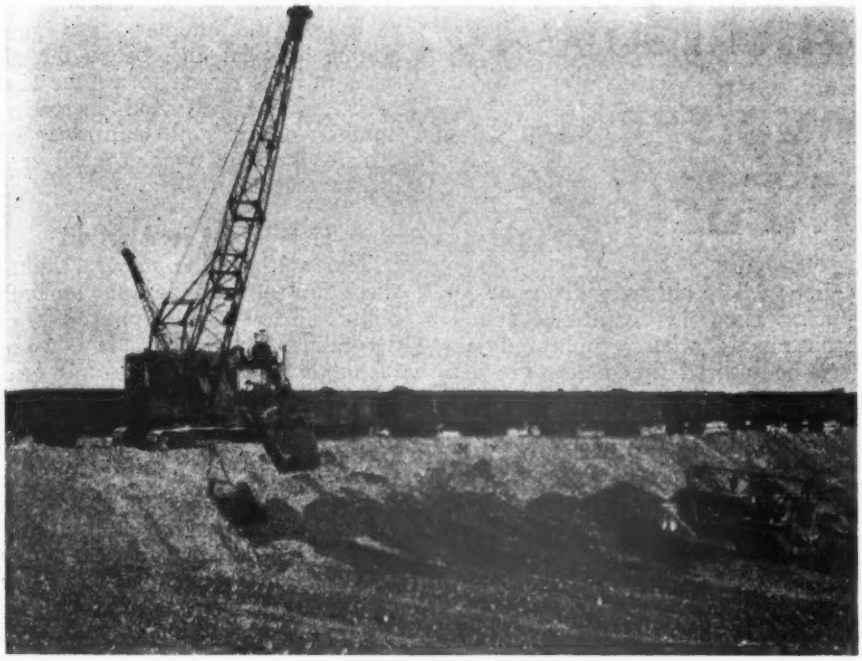
From this point we shipped by rail from 750 to 1,000 cubic yards of material a day under normal conditions. Also, much of the material was trucked directly from the plant to the road.

A loading ramp was constructed so we could back the trucks up and dump directly into the railroad cars. These cars were in deplorable condition and required a crew of about 15 coolies to patch them so they would hold the material. Our only source of patching material was crating from the truck assembly plant.

This pit furnished crushed rock and sand for the Port of Korramshahr about 180 miles south and for the topping of about 220 miles of the highway in the Gulf and Desert Districts and also for all the hospitals and camps along the way.

From the foothills and through the mountain road from Andimeshk

The crane feeding the 35-ton plant, which was used chiefly for engine sand.



A dragline loaded pit run into cars; this material was used for road-bed and road-base.

north to Tehran, the crushed rock that was used on that section of the road was produced by a 25-ton portable Cedarapids crusher which was spotted at various places along the road where material was available.

About a half mile from the pit where our crushers were located, we had another pit known as the Railroad pit and from this was taken all the gravel that was used for the railroad road-bed from the Port to Andimeshk, a distance of about 200 miles. This was a deep open pit and the tracks ran down into it. The loading was done with a Northwest dragline. Some civilian engineers from the Foley Brothers Engineering Company found some very good rubies in this pit.

We had an excellent safety record for the year that I was in charge of the pit. We had about 40 soldiers and 50 coolies working around this heavy equipment all the time and we never had a person injured. Our biggest health problem was the natives getting so sick with malaria that we would have to let them go.

This was supposed to be the hottest place in the world. The temperature would run up to 130 degrees F. or over in the shade and in the sun to more than 160 degrees. We were told that only five miles from the pit the temperature had been recorded at about 180 degrees in the sun.

California Silica Sand

(*From page* 104)

unit is changed frequently to produce various sizes of washed-and-dried sand, the output passing to six bins below. Two of these bins hold 120 tons each, the remaining four being of 60-ton capacity. The two Hum-mer screens carry 20-mesh cloth and the "throughs" are subjected to air separation for further classification before passing to the storage silos, or to a battery of magnetic separators.

There are three concrete storage silos, each 20 feet in diameter by 60 feet high. Cars are loaded directly from these silos, or the sand can be reclaimed by a conveyor operating in a tunnel beneath them for further processing, packing, or both.

The six Dings 2-roll, 30-inch, induced-roll magnetic separators which have been housed in a frame structure are being moved this summer to a new and larger concrete structure and the separating capacity is being doubled by the addition of six more magnetic units of similar design and manufacture, making 12 in all. The magnetic separators remove micaceous material in addition to their prime function of extracting the iron, reducing the content of the latter to about .04 per cent. (never over .05 per cent.) With the iron content thus reduced to a safe minimum the sand is ideal for glass-making purposes and the bulk of the product of the separators is sold thus, although increasing tonnages of the output is being demanded by the building industries for use in high-grade stucco and plasters. Two G.E. motor-generator sets, one for stand-by service, supply direct current to the coils of the magnetic-separating units.

Some of the product of the Hummer screens is diverted to the grinding plant where, after passing a single Dings magnetic separator, the sand is pulverized in a Hardinge 8-foot pebble mill, with Hardinge air classifier in closed circuit with the mill. The product — 98 per cent. passing 200-mesh—is packed in 100-pound bags by a single-spout St. Regis packer. The 120-mesh product, drawn off from the air separator before being returned to the mill, is hand-packed in bags. A separate cyclone is also employed to take off a microscopically-fine product that is so light and fluffy that a sackful (which would weigh 100 pounds in the 200-mesh product) weighs but 50 pounds! It is sold for special chemical and laboratory uses. The 200- and 120-mesh ground products, or silica flours, are sold to the ceramic, paper-making, insulation, and other industries.

Coarse sand trucked in from nearby beaches is also processed for filter and blasting sands.

Operations at the Del Monte plant are carried on under the general supervision of E. C. Hurlbutt, who has been in charge of production since 1924. A small laboratory is maintained at the plant and shipments go out over the Southern Pacific Railroad. Water for washing is taken from the mains of the municipally-owned Pacific Grove water system. Main offices of the company, and of the sand division, are located in San Francisco.

A plant devoted exclusively to the production of glass sand adjoins the one described here and is owned and operated by the Owens-Illinois Glass Company under a royalty arrangement.

Access to both plants is by the Seventeen-Mile Drive, an automobile toll road operated by Del Monte Properties which is world-famous among travelers for the scenes of breath-taking beauty panoramically revealed as one traverses the drive which skirts the rugged shores of Monterey Peninsula and penetrates the pine-crested slopes of the hills.

The twenty-sixth annual meeting of the Highway Research Board will be held this year from December 5 to 8 at the building of the National Academy of Sciences and the National Research Council in Washington, D. C.

The Magnet Cove Barium Corporation, of Malvern, Ark., is actively engaged in surface mining operations on its Gap Mountain barite property near Hopper, Ark. Overburden is being stripped from one of the ore-bodies.

Why, When and How to Gasify Solid Fuels—Some Practical Factors

By WOLF G. BAUER
Consulting Engineer

IN the non-metallic industries, as well as in the more familiar fields of metallurgy and ceramics, the problems of roasting, calcining, sintering, fusing, fluxing, melting, dehydrating and drying all revolve around the economical and controlled application of heat produced directly or indirectly from fuel. The design and cost of any heat-treating installation is dependent on the type of fuel available, and on the degree of control needed for the operation.

This paper intends neither to foster nor to detract from the use of artificial gas in the aforementioned industries. It is rather the aim to bring to the attention of the reader some of the practical factors that may decide him for or against the employment of gas producers in a more positive manner, and also to review some of the basic conditions that must be met to generate heat efficiently and economically by the indirect method of gasifying the fuel before burning. It may further be pointed out that, due to lack of clear understanding of the simple principles involved, many small and medium-size operations using costly fuels, or outmoded direct-firing methods without control at the point of applications, would do well to consider certain advantages of gas firing in relation to their processes and requirements.

Conditions Making Gas-Firing Desirable

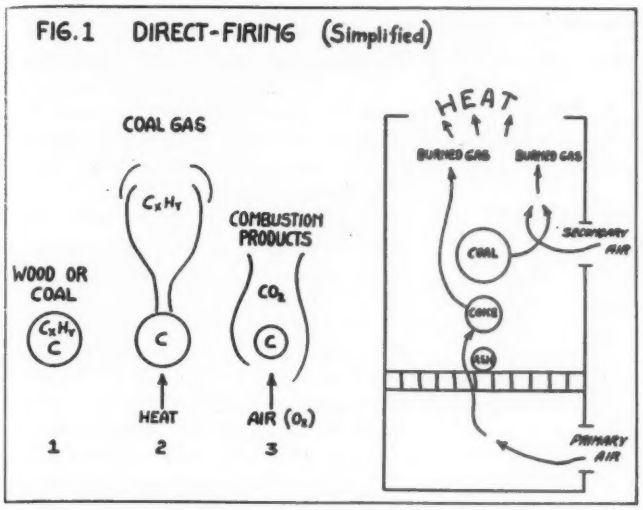
The demand for closer processing control is ever more evident, and where certain types of fuel such as natural gas and oil are available, there is absolutely no excuse for lack of automatic or semi-automatic positive control of air and fuel input for highest efficiency and full process temperature regulation. However, there are, and will continue to be, many sections in this and other countries where such easily controlled fuels are non-existent, and where only some grades of coal, wood, cellulose waste, peat, or wood waste are available. There are certain processes in which high-intensity heat must be generated at certain spots in kilns and furnaces; where temperature variations must be minimized; where either oxidizing or reducing atmospheres must be closely maintained; where preheated air can be utilized in connection with the cooling of the treated material, and where such recuperation is a distinct economy; where flames and heat must be either concentrated or distributed in one or more widely separated burners and locations; where combustion space is limited, as in vertical type kilns and calciners; where a soft luminous flame of large volume is desirable under some of the aforementioned restrictions for highest heat transfer rate; where contamination of ash from high-ash coals or coke is not permissible for quality products or dust nuisances, as in pulverized coal firing; and where mechanization and continuity of heat production on a large scale is required under conditions of radiant heat transfer.

There are those who maintain that the days of gas producers and producer gas firing will soon be a thing of the past. On the contrary, it is the writer's firm belief that the future will see a wider application of the principles of solid- and waste-fuel gasification. It is quite true that since the advent of powdered coal firing, many operations using gas producers have been converted to this direct-firing system in such instances as the firing of rotary kilns, for example. Oil burning, where possible, has also been substituted despite higher relative fuel costs. However, oil will not be always available for industrial heating, as the petroleum industry gradually leans more strongly toward the manufacture of synthetics and hydrocarbon derivatives for chemical uses. Because of limited supply and similar chemical outlets for natural gas and its restricted distribution, this fuel will also slowly become a less important source of industrial fuel. Decisions on the selection of solid-fuel burning systems will rest with the type of coal available, and its suitability to the process, as well as to the heat-generating devices. With further improvements in mechanical producers and the introduction and perfection of automatic gas generators for coal fines below 6-mesh sizes, there is reason to assume that producer gas will find increasing numbers of applications in many industries working under special conditions and control.

How Heat Is Applied

The non-metallic mineral industries use heat in many ways for both high- and low-temperature work, or a combination of both. It is a sad fact that when both high- and low-temperature phases are required in the same process, generally only one apparatus or device is used to provide facilities for such heat exchange. In some instances we even find the same device used in two stages, yet for two entirely different principles of transferring heat. There are still some operators who labor under the impression that all B.t.u.'s in their fuel can do the same amount of work anywhere in their process. It is true, all heat units have equal values of energy, but they most certainly refuse to do the same amount of work in the wrong spot or location. Conditions must indeed be made attractive for them to get them to join the material to be processed; and, whereas the high-temperature B.t.u.'s are not so choosy, the low-temperature units must be swept along and be impinged upon the material with high-speed carrying gases, and at points in the process where the material is decidedly low on B.t.u.'s itself. The high-energy B.t.u.'s jump off in any and all directions if they have room and straightline paths, but the low-energy units must be actually scraped off against the material surface.

The point we wish to make is this: the high-energy B.t.u.'s are limited. They ought to be absorbed from luminous flames by the material directly, and not be dissipated in overheated fire boxes fired direct by stoker or hand, sending them out in non-radiating products of combustion gases from which they must be abstracted mainly by convection. The rest of the heat units are of low-energy level in gases below red heat, or below the particular process temperature, and must therefore be used to preheat the material to this temperature, preheat the combustion air, dry the fuel and heat it, or all of these. By firing with gas fuel, we can generate high B.t.u. heat where we need it close to or within the material bed, without introducing fuel ash, and without need for a large combustion space as is needed efficiently to burn pulverized solid or dispersed liquid fuel.



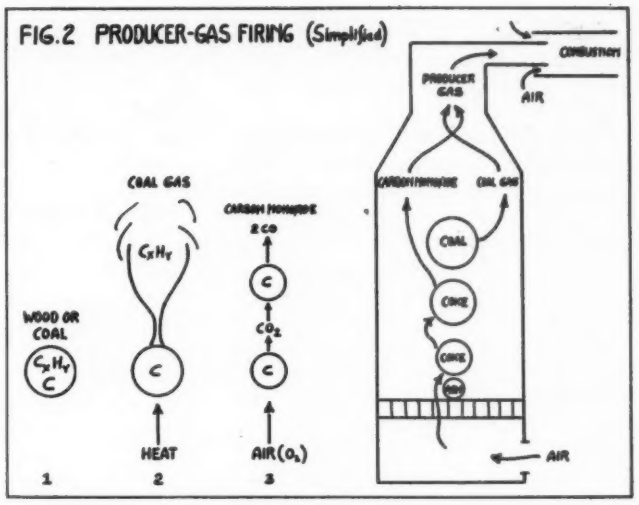


Fig. 1. Diagram of direct firing, showing introduction of secondary air.

Fig. 2. Simplified diagram of producer-gas firing.

Where Heat Is Required

Outside of gypsum kettles or vertical kilns, most heat treating is done in rotary kilns and driers. Rotary kilns are used for the manufacture and treatment of cement, refractory dolomite, refractory magnesite, lime, gypsum, bauxite, clays, artificial aggregates, phosphates, brucite, light-weight aggregates, calcination of sludges, and certain salts for low-temperature dehydration. Rotary driers are employed in industries treating agricultural limestone, silica sand, cements, asphalts, asbestos, roofing granules, tripoli, industrial clays, nepheline syenite, talc, feldspar, pumice and pumicite, brucite and others. There are also vertical kilns such as used in the lime, dolomite, and masonry cement fields which present altogether different problems in heat application. In most of these processes ash contamination is a condition to be avoided, and close control of heat and its recuperation and regeneration are conditions to be sought.

Principles of Gasifying Solid Fuels

We do not wish to tire the reader, at this point, with an academic discussion of the chemical nature of fuels and their combustion. In fact, in order to take the mystery out of gas-making from solid fuels, let us look more at the physical phenomena of gas generation, and how it differs from direct firing.

Anyone who has shoveled fresh coal on a hot bed of coke in the home furnace or boiler grate, or thrown fresh dry wood into a hot firebox or fire place is familiar with the bright flashes of flame immediately enveloping the fresh piece of fuel. We say that the volatiles are flashing off and burning. All solid fuels except coke and charcoal contain various quantities of such constituents as ethylene, propylene, benzene, hydrogen, methane, steam, and oxides of carbon which are trapped or held in solution within the pasty and ligneous substances of coal and woody cellulose, and which are volatilized like water turning to steam, or gas bubbling from charged beverages when pressures are relieved. Since some solid fuels have as much as one-half of their heat content tied up in these volatiles, we can readily understand why continuous mechanical feeding of solid fuels containing large quantities of volatile matter has become necessary in order not only to release the heat units of the fuel more evenly and continuously, but also to prevent serious loss from incomplete combustion during the time these volatiles expand into the firebox with insufficient air to burn them.

After these hydrocarbon and other gases have been driven off, we have left the fixed carbon and ash in the form of a more or less porous form as coke or charcoal. This carbon residue burns with air coming up through the grate, combining with the oxygen to form carbon dioxide, each pound of this carbon releasing about 14,500 B.t.u. in the process. Part of this heat helps to distill or release some of the volatiles from the fresh coal in the immediate vicinity. (See Figure 1.) Extra or secondary air must usually be added above the fire bed to burn these fuel gases from the coal. If we did not add this additional air but allowed them to pass off with the burned gases from the coke bed, we could ignite these later at the point where we want most heat in the drier or kiln. This is often called semi-gas or Dutch-oven type firing, in which it is the purpose to achieve some delayed combustion farther along in the heating chamber. However, it is the nature of gas to ignite with greater difficulty when it is diluted to any great extent, in which case it requires thorough mixing under turbulent conditions and high temperatures.

Basically, in order to produce a combustible gas from our firebox, we need only to deepen the fuel bed and eliminate the secondary air. If we deepen the fuel bed, we cause the CO_2 gas, which we produced from the combustion of coke in the lowest layers, to pass over another layer of hot coke or charcoal. When the temperature is high enough, the hot CO_2 gas and the hot carbon of the coke are chemically very reactive, and join to form carbon monoxide gas, absorbing about 40 per cent. of the potential heat of carbon combustion. (See Figure 2.) How much of the carbon dioxide is reduced to monoxide depends on the temperature of the carbon and the gas, and how efficiently the up-coming CO_2 is made to contact the extra hot coke or charcoal. The higher the temperature, and the lower the partial pressure of oxygen in the vicinity, the greater the tendency and reaction force driving the combination toward monoxide formation.

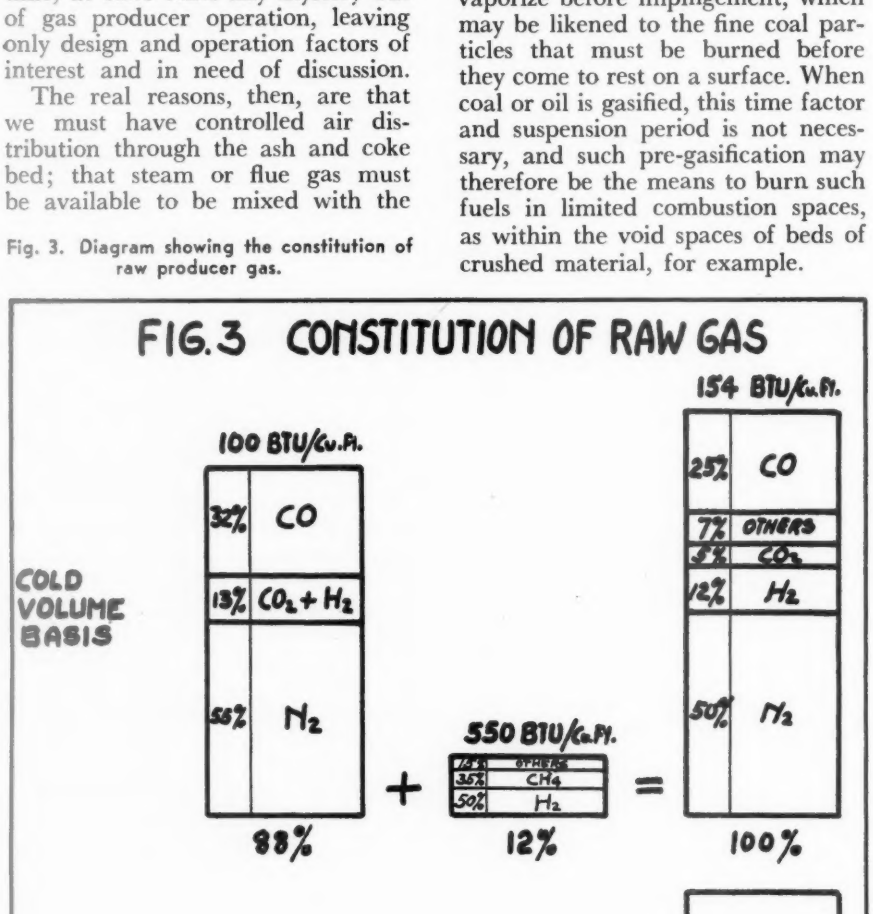
Of course, other reactions also take place, such as the production of hydrogen and hydrocarbons burning to water and carbon dioxide. Fundamentally we are, however, concerned only with the fact that we have produced a combustible gas from the coke, and that, along with the distilled coal gases from the top of the bed, we have a mixture called raw producer gas. This gas is made up of coal gas of about 550 B.t.u.-cu. ft., and carbon monoxide and hydrogen diluted with nitrogen from the air having a heat value not over 100 B.t.u.-cu. ft., the mixture averaging about 150 B.t.u. We compare this to city gas having a content of about 480 B.t.u., and natural gas of 1,000 B.t.u. per cubic foot. Figure

3 depicts the relative gas volumes and heat contents of these gases which combine to form raw producer gas.

Now why can't we just go ahead and continue to make such a combustible gas in our deep fuel bed fire box? Well, we can indeed, but operation would not be continuous or economical, and we would have to have exceptionally good producer gas coal. With wood fuels this is not the case to the same degree, and reasonably good gas can be made if wood is clean and slagging on the grates can be prevented. The fact that a simple firebox with a grate can be made to act as a gas generator, even if it is only for a short time, at once takes any mystery out of gas producer operation, leaving only design and operation factors of interest and in need of discussion.

The real reasons, then, are that we must have controlled air distribution through the ash and coke bed; that steam or flue gas must be available to be mixed with the air for controlling reaction zone temperatures and so prevent clinkering of the ash; and that coal and ash must be charged and removed without disturbing the gas supply to the burners.

Fig. 3. Diagram showing the constitution of raw producer gas.



What Fuels Can Be Gasified?

All fuels can be more or less gasified, as the gasifying stage is accompanied with the combustion process of solid and liquid fuels in almost instantaneous reaction time. Although we can readily gasify oils and then burn the oil gas, such gas generation and use is rather narrow and specialized. Oil, like powdered coal, requires combustion space in order for the dispersed droplets to vaporize before impingement, which may be likened to the fine coal particles that must be burned before they come to rest on a surface. When coal or oil is gasified, this time factor and suspension period is not necessary, and such pre-gasification may therefore be the means to burn such fuels in limited combustion spaces, as within the void spaces of beds of crushed material, for example.

Wood Substances Wood, peat, bagasse, and waste shells and hulls can all be easily gasified, but their size and moisture content, as well as particle shape, all call for special generating chamber design. Since these fuels are very low in ash, air distribution and distribution means vary radically from such fuels as coal and coke which rest on a bed of more or less porous ash and clinker particles through which the air passes.

When using waste hulls, bagasse from cane, sawdust and any woody shredded or hogged fuel, it is important that the fuel is reasonably dry because the bed must be maintained quite deep. If the fuel is too wet, the gases will be lean because of dilution with steam, and also low temperature, giving rise to troubles with tarry condensations in the supply mains and valves or burners. Wood itself may be gasified in form of cord wood, sawed-up blocks, sawmill slabs or chips. With the larger sizes, the bed must be rather deep, at least 6 feet. Moisture inhibits quick volatilization, and even though less heat is available in the gas because of the diluting effect of the steam and the heat absorbed in evaporating the water and heating the steam, a certain amount of it in the fuel makes for easier producer operation. When wood is from logs, the latter should be cleaned of dirt by washing so as to prevent slagging if grates are used. If this is impossible, grates should be dispensed with, and air introduced through ports in the sides and center of the chamber bottom.

Coal All coal makes gas, but not all coals give trouble-free operation in producers. Particle size of coal is probably best between three- and half-inch size, although fines may be utilized along with coarse sizes in certain instances where the coal cokes and expands to allow passage of air and gases. Much depends on the fusion and softening of the coal, which should not cake or gum up too strongly, but be free-burning so as to keep the bed porous and open. If coal becomes too sticky and plastic on top of the bed, shallower beds are generally carried to hold temperatures higher.

We have already pointed out that the volatile gases distilled from the top of the bed are higher in heat value, and so it becomes apparent that a high-volatile coal, say 45 per cent., produces a richer gas of more luminous burning characteristics. When the gas is used in the hot and raw state (1200-1600 de-

gress F.), this is a decided advantage. However, when long distributing mains are required in which heat losses allow tars to condense out on burners, valves, and gates, or when the gas must be scrubbed and cooled before use, such high volatile contents can become detrimental to economical operation. In practically all burning applications in the nonmetallic industries, hot raw gas may be employed.

One of the most consequential characteristics of the coal is the melting temperature of its ash. These minerals may contain considerable alkali salts or iron which act as fluxes and cause the ash to clinker and fuse together into large bats, producing hereby an uneven air-passage condition which quickly destroys the gas-making power of the producer. It was pointed out earlier that the higher the temperature of the CO_2 reduction zone, the more complete the formation of carbon monoxide. It is therefore only the fusibility of the ash that determines how high a temperature may be allowed to exist in this zone. For reasonably good gas of low CO_2 content and freedom of clinkering, this fusing temperature should be above 2500 degrees F. Limited ash fusion or vitrification is, however, desirable when it brings about a granulation or agglomeration of the fine ash, as this promotes a porous ash bed condition so necessary for good air distribution. The quantity of ash in coal affects costs both in lowering the B.t.u. and increasing removal charges.

Coke This fuel is used only infrequently for gas production because of the rather low heat content of the gas, which burns with a weak, non-luminous flame. It is used for gas making generally in by-product coke ovens for heating the retorts. If the heat user has cheap coke available, it makes a very nicely controllable and trouble-free fuel in any kind of producer. The gas may be enriched by admixing some high-volatile coal or wood waste with the coke, or spraying some oil into the producer. Coke fines are a distinct disadvantage, and must be kept at the minimum. The fuel bed can be kept very deep, and little poking or stirring is required. Coke does not have to be charged continuously in small quantities, as there are no volatiles to change the gas composition after charging.

Producer Design

For our purpose in this condensed introductory article, we may distinguish three basic classes of solid-fuel gas producers. Only two of these classes embrace most of the present day generators. These are the horizontal rotary type, the vertical mechanically operated machine, and the various forms of vertical hand-operated producers. The first type is not prevalent. The mechanical types are for high-capacity centralized gas production. The hand poked and fed types are either built-in or small close-coupled producers of more limited output. Others, like the suction type for power purposes, or the slagging type, will not be discussed here. A fourth type, designed for utilization of fine particles of solid fuel, is perfected by the writer and other investigators, and some operating data and test results will be available for discussion in the future.

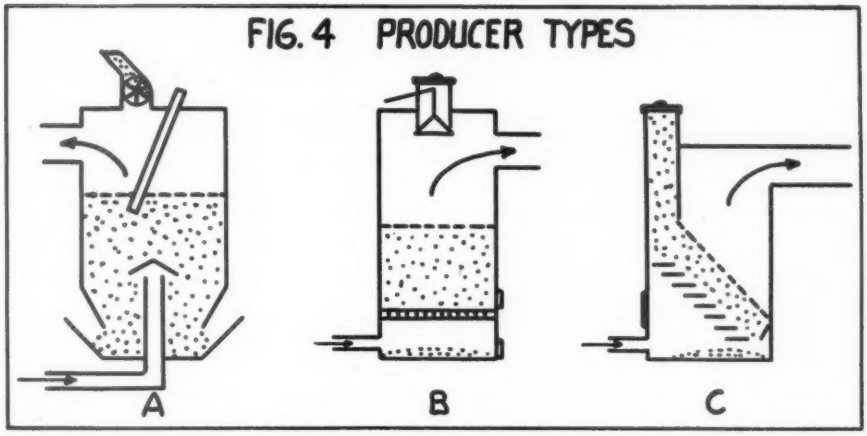


Fig. 4. Type A air distribution and ash supporting means covers most of the mechanical producers; Type B covers all producers using bar or shaker grates; Type C utilizes a step grate.

The common mechanical producers have no grates, are circular in cross section, and employ blast hoods for central air introduction means. The hand-fed-and-poked types may have bar, shaker, or step grates, as well as blast hoods, ducts, or tuirres, depending on their shape, whether they use air or water seals, and the nature of the fuel. Operation of a producer centers around the following types: 1. fuel charging through an intermittent or continuous gas lock, coupled with distribution of this fuel over the bed area; 2. ash removal continuously or intermittently, with or without momentary stoppage of gas production or pressure; 3. introduction of conditioned air in controlled quantities and distribution through the ash and fuel bed.

Figure 4 covers three fundamental air distribution and ash supporting means, any of which may be for circular or rectangular chamber cross section. Type A covers most of the mechanical producers for both coal and coke in which either the shell or the ash supporting pan may revolve. This arrangement is also suitable for rectangular manually-operated generators, in which case the air hood or blast cap takes the form of one or more cross ducts provided with spaced air holes or slots. This type is often water-sealed, although the air distributor may be placed high enough up in the ash bed to cause the ashes themselves to act as a seal below the air ports.

Type B covers all producers using bar or shaker grates, and may use wood or wood wastes as well as coke and coal. As shown, in this type the air must be momentarily shut off while ashes are removed, or clinker is sliced out above the grate, although the writer has operated this type also on hogged fuel with a water seal. Type C employs a step grate which may be located as shown, or arranged in inverted positions as a central cone or pyramid. The advantages of this type of grate lie chiefly in greater accessibility for poking into the ash and clinker bed, in the fact that fuel may be piled up to the charging door for protection of heat to iron fittings, and in the important fact that the depth of bed is automatically and constantly maintained. Such a grate arrangement is most frequently used with coke and wood waste fuels.

Structural Features

Mechanical producers for bituminous coal are revolving vertical cylinders with water-cooled tops and stirring pokers, and a dished water-sealed ash pan that may also revolve. All producers are lined with fire brick. The blast hoods are usually cast iron, air and steam or flue gas mixtures being blown through them by pressure fans or steam-turbine blowers. Pressures are from 6 to 15 inches of water. Coal is fed by water-cooled rotary or other type feeders incorporating some gas-locked feature, while ashes are removed either periodically or continuously by a scraper blade in the ash pan

which plows the ashes out. Ashes are removed by slow-moving chain or belt conveyor. The poker or stirring arm extends into the upper distillation zone, and because of its off-center position describes an elliptical path through the bed. In others, the water-cooled arms are revolving and the producer shells are stationary. Small punching holes are located in the tops of all producers to break up clinker, plug up blow holes, and take measurements of ash, fire zone, and coal bed depth condition.

The smaller type of hand-operated producers are usually rectangular, but may also be round or oval in cross section. They are always best built of steel plate and refractory lined with some insulation. Although they may be operated with natural gas, usually they are mainly blown with fans. Due to their much lower gasification rates, they may be blown without steam or flue gas when coals with high fusion ash are used, or when wood or waste is gasified. They are simple and economical to build, and if designed correctly for the fuel used, they are ideally suited for furnishing controllable gas and heat from coals unsuited for pulverized coal or stoker firing, from coke, or from wood and wood waste, peat, or refuse. When situated close to the burner, little sensible heat is lost in the gases coming from the producer.

All mains and ducts are lined with insulating refractory or refractory brick, and provision is made for settling-out of dust and soot along the way, as well as for cleaning and burning-out facilities. Design of valves, grates, burners, soot-legs and mains all hinge on the temperature and composition of the gas generated, and when correctly built, they give little trouble.

Cost of Gasifying Solid Fuels

In any heat-treating installation we require at least one operator, no matter how small or large the operation, or how little or well mechanized it is. We realize the need for mechanization, and we have the means. We also are quite aware that additional charges for depreciation due to increased mechanization do not always bring about proportionate reductions in labor costs, but may be warranted solely for increased heat efficiencies, or better control over product quality. Gasifying solid fuels may be such a case to consider, as also the relative merits of mechanical versus hand-operated gas generators. In most heat-generating and burning systems the operator has to tend to valves, gages, burners, meters, pulverizers, stokers, feeders, pumps, fans, or instruments. Firing rotary kilns, driers, or other heat-treating furnaces, kettles or calciners requires an operator to produce and control the heat. We are therefore justified in charging the operation of the well-arranged gas producer to the burning operator, and only the extra labor involved over that required with similar fuels need be shown an additional cost when such comparisons are made.

Fuels which show similar results and advantages in their use for special applications are those characterized by absence of ash contamination, generation of radiant heat at the point of application to the material, possibilities of distribution from a central source, and those which allow highly preheated air to be used for their combustion. Aside from available coke-oven, blast-furnace, or cupola by-product gases, oil, natural gas and producer gas are the three fuels which may be applied most favorably to meet these conditions.

Oil and natural gas are ideally suited for automatic burning control. Natural gas has the advantage in that it can be burned in restricted spaces and readily brought to the burners through ports and simple ducts. When these two fuels are not available, or when they are extremely costly, clean cold or hot raw producer gas may become the choice. All this is a matter of pencil sharpening and some ingenuity in application arrangement. What does it cost to make gas? It depends a good deal on the size of the installation and the degree of mechanization, as the depreciation charges are among the largest cost items. As we indicated previously, the producer operator will be assigned also as firing operator, so that labor charges are only for extra coal and ash handling. Using raw gas, installing a flue-gas and scrubber with fan instead of steam for clinker control, providing as much mechanical ash and coal handling means as possible for the small operation without charging fuel preparation or delivery to the producer, or gas mains to the point of gas application, cost distribution is roughly estimated as shown in Table I below.

To compare cost of producer gas with natural gas and oil on an equivalent available heat value basis, we may assign a charge of 17 cents per barrel of oil for oil preparation costs, and disregard the small cost for natural gas. Table II compares these fuels in cost with coal at $4 and $6 per ton delivered to the producer.

Future Developments

Developments in one industry often lead to improvements in others. Specifications as to product quality force stricter processing control upon the manufacturer. Other and more vital uses for petroleum and natural gas outside of industrial fuel and heating applications will bring renewed emphasis on the utilization of some of the lower grades of solid fuels. Gasification of low-grade, high-ash coals will no doubt lead to radical departures from present designs and techniques in gas production. The inability of present-day producers to gasify certain low-fusing ash and non-coking coals will lead to new developments and principles of gasifying such and other coals in powdered form, and thereby also overcome the drawbacks of direct firing pulverized coal with its attendant ash contamination with high-ash coals, and needs for roomy combustion space. Pulverizing of coals with subsequent gasification and ash removal is being investigated and tested by the Chicago Institute of Gas Technology, by the writer, and others. The solution of the problem will considerably extend the applications and enhance the economics of solid-fuel utilization through intermediate gasification.

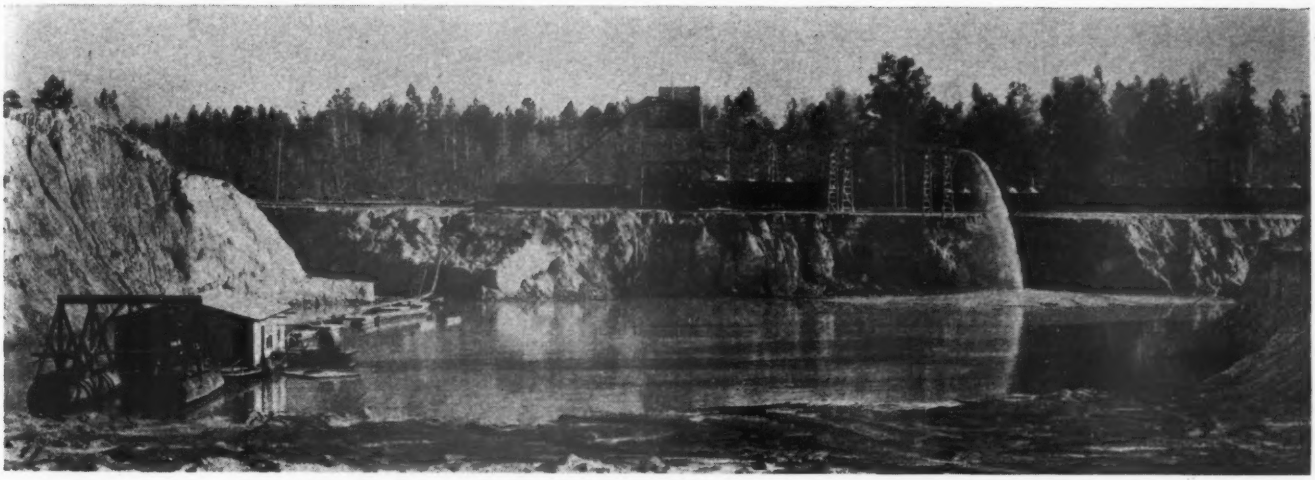
TABLE I

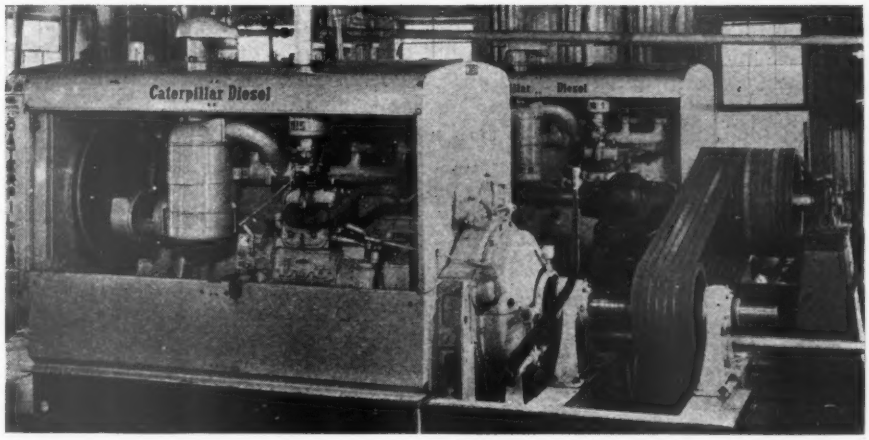
Tons coal per day	45	15	5
Type installation	Large Mech. Producer	Small Mech.	Hand-Operated
Investment	$70,000	$40,000	$20,000
Cost per ton coal—			
Extra labor	$0.25	$0.30	$0.80
Power	.15	.20	.25
Repair and miscellaneous	.20	.20	.20
Depreciation 10%, 300 days	.55	.90	1.00
Add to price of coal (Deliv.)	$1.15	$1.60	$2.25

TABLE II

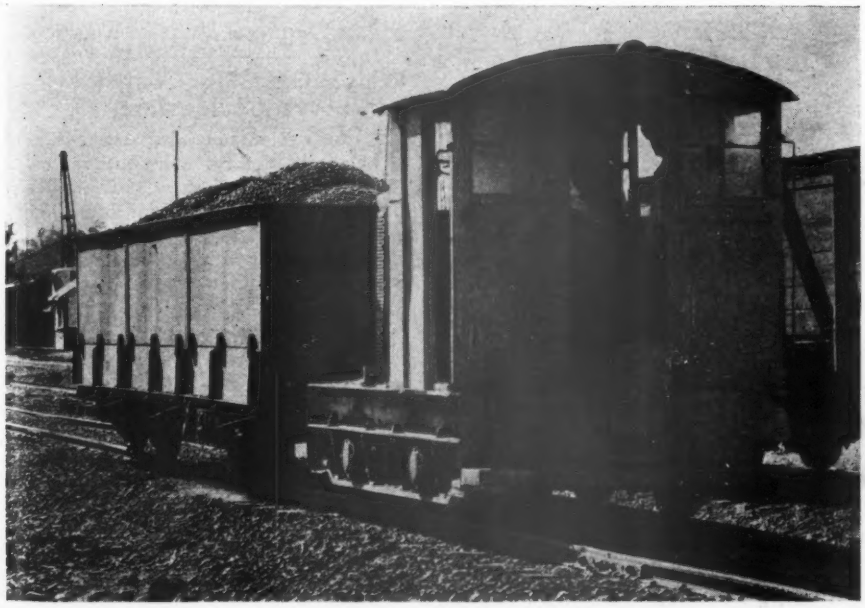
Tons of Coal per Day		45	15	5
Coal at $4 per ton	Nat. gas/1000CF	$0.19	$0.21	$0.23
	Oil/bl	1.33	1.42	1.58
Coal at $6 per ton	Nat. gas	.26	.28	.31
	Oil	1.78	1.89	2.03

Gifford-Hill Uses All-Diesel Power At Louisiana Gravel Plant Operation





Above: General view of Gifford-Hill & Company's sand and gravel plant at Turkey Creek, Louisiana. Right: On the dredge two Caterpillar D-13,000 Diesel engines drive an Amsco 8-inch centrifugal pump, each engine consuming 7 gallons of fuel oil per hour. In a 2-shift, 20-hour day, this equipment pumps 400 cubic yards of gravel and 300 cubic yards of sand.



Left: This Plymouth locomotive is powered by a D-8,800 engine, hauls 45-ton loads from the dewatering screen to the grading screen. Below: Caterpillar D-7 tractor with LaPlant-Choate bulldozer clearing and grading for railroad spurs.

New Mexican Cement Plant Producing 825 Barrels per Day

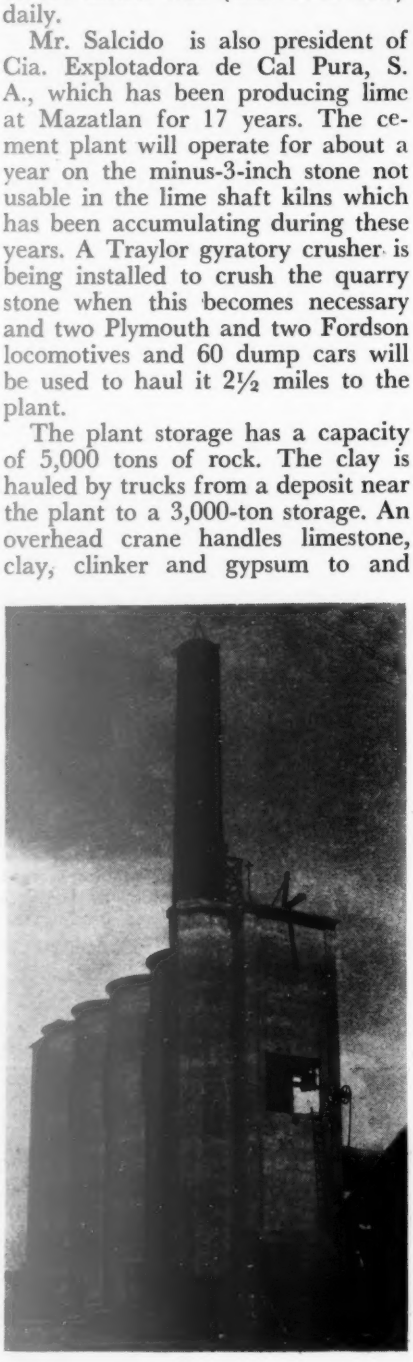
By WALTER E. TRAUFFER

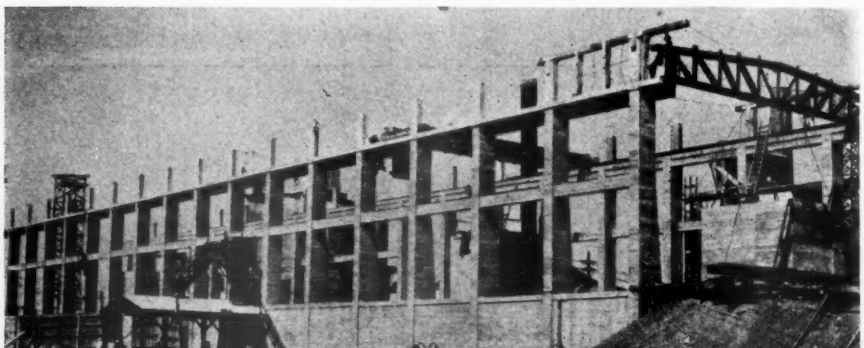
another ON THE SPOT report

WHEN the writer made an extensive trip through Mexico a year ago, to get a comprehensive picture of the cement industry there and its growth, one of the plants under construction was that of Cementos del Pacifico, S. A., at Mazatlan, Sinaloa. This plant, according to Ramon Salcido, president of the company, went into operation on April 9, 1946, and has a capacity of 150 metric tons (825 U. S. bbl.) daily.

Mr. Salcido is also president of Cia. Explotadora de Cal Pura, S. A., which has been producing lime at Mazatlan for 17 years. The cement plant will operate for about a year on the minus-3-inch stone not usable in the lime shaft kilns which has been accumulating during these years. A Traylor gyratory crusher is being installed to crush the quarry stone when this becomes necessary and two Plymouth and two Fordson locomotives and 60 dump cars will be used to haul it 2½ miles to the plant.

The plant storage has a capacity of 5,000 tons of rock. The clay is hauled by trucks from a deposit near the plant to a 3,000-ton storage. An overhead crane handles limestone, clay, clinker and gypsum to and from storage. The limestone goes to a Kennedy-Van Saun gearless gyratory crusher which reduces it to ¼-inch maximum. The clay is crushed in a dry pan and the same drier is used alternately for the clay and the stone.





View of the Cementos Pacifico plant at Mazatlan, Sinaloa, Mexico while under construction.

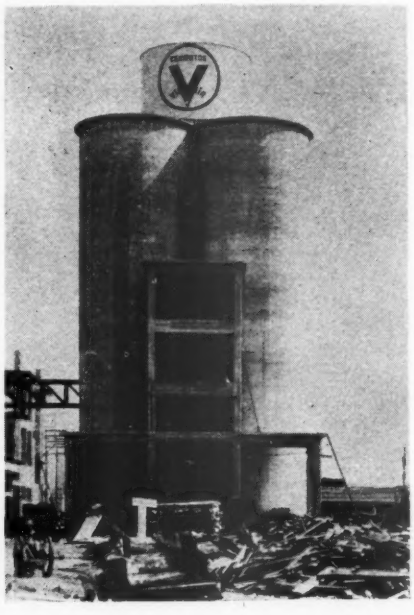
In the raw-material grinding department there are four 510-ton bins, and two No. 66 Kominuters followed by two tube mills in series. Blending is done in four 900-ton silos followed by a 250-ton kiln-feed hopper. The 8- by 150-foot kiln is followed by a 6- by 50-foot cooler.

The clinker and gypsum sections of the storage have capacities of 6,000 and 600 tons, respectively. The crane feeds these materials to 100- and 10-ton hoppers in the finish-grinding department. There two No. 66 Kominuters and two 5½- by 50-foot tube mills are operated in series. The finished cement is stored in six 6,000-bbl. silos and packing is done by one Valve Bag machine.

This plant was designed and built by the MacDonald Engineering Co., and most of the equipment came from U. S. plants. Space has been left for the installation of a second kiln which will double the capacity of the plant. Standard portland, pozzuolanic and mortar cements are made.

The lime plant now has a capacity of 25 metric tons daily. It is to be modernized and enlarged to a capacity of 60 tons daily and hydrating equipment will be added.

The six 6,000-barrel silos in which the finished cement is stored.



Lehigh Gets Big Contract For South Coulee Dam

First of a number of large contracts to be awarded for cement to be used in the construction of the Columbia River Basin project was an order for 125,000 barrels assigned to the Lehigh Portland Cement Co. by the U. S. Reclamation Service. Lehigh operates a plant at Metaline Falls, Wash. The order, largest since the construction of the Coulee dam, will be used to build the South Coulee dam, the feeder canal, a pumping plant and other installations.

The Metaline Falls plant is now producing at 50 per cent. of capacity because of a labor shortage and reduced coal supplies. Shipment of all orders awarded must be made within 20 calendar months. Contracts for the remaining 225,000 barrels of cement needed have not been assigned.

LOW-COST OPERATION FEATURE OF PLANT IN OLD CALIFORNIA GOLD MINING AREA

another ON THE SPOT report

UP Chile Gulch, in the Mother Lode country of California where the gold rush began nearly a century ago, a rather remarkable commercial aggregates plant went into operation last year. Outwardly the plant, owned and operated by

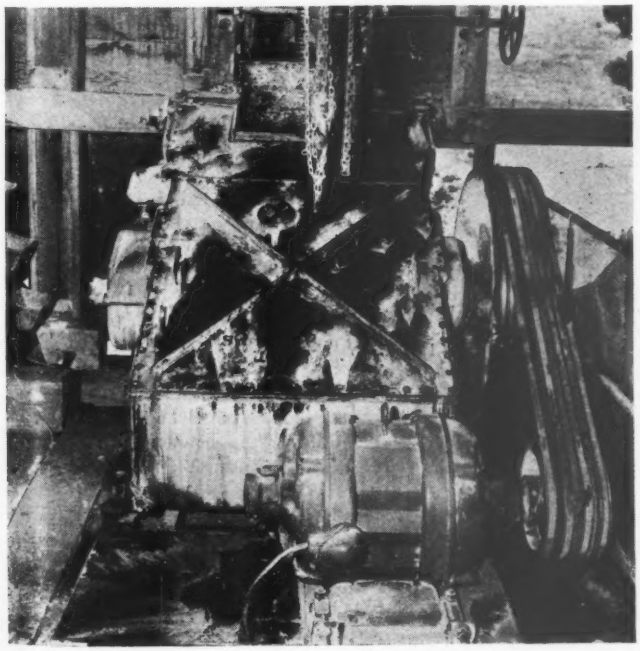
By HARRY F. UTLEY

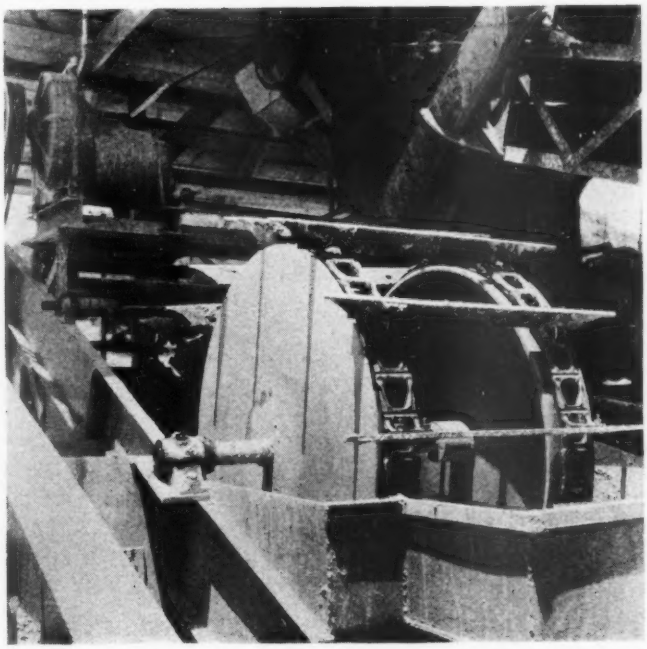
C. W. Neilsen of San Andreas and his three sons, Clinton, R. E., and Lawrence, is quite ordinary in appearance, the unusual feature being the extremely low power consumption required in processing the materials.

The plant's total connected motor horsepower is only 41 . . . yet production is steadily maintained at the rate of about 65 tons per hour for washed and sized material and has reached 100 tons per hour when a large percentage of graded but unwashed road gravel was being turned out. Electric bills for the plant seldom exceed $25 per month, power being purchased from the Pacific Gas & Electric Co.

Built in 1945 over a 40-day period when equipment was next to impossible to obtain, the Neilsens designed and fabricated much of the machinery, including the vibrating screen, feeder, sand washer, and the bins. These units are highly efficient and embody ideas which the Neilsens developed during the many years they have been engaged in gold mining operations. The "heart" of the plant is the No. 50 Kue-Ken balanced jaw crusher which does all the crushing, yet requires only a 25-horsepower motor to break down the oversize, the jaws being set at about 1 inch. Combined with the fact that the crusher is unusually efficient and requires so little power to operate, is the fortunate circumstance that the deposit contains few if any boulders over 4 or 5 inches in size which might otherwise necessitate the use of a primary reduction machine. This lack of large pieces is due to the fact that the deposit consists of tailings produced as the result of extensive hydraulic mining operations for gold before the turn of the century when the Mother Lode swarmed with gold seekers. Although the Neilsen plant is equipped with riffles in the sand

The Neilsen gravel plant near San Andreas, California. Water-supply sump is on the left.





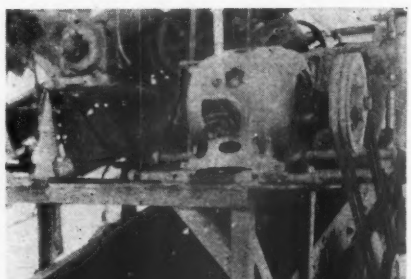
Left: Balanced jaw crusher, which does all the crushing, is driven by a 25-hp. motor. Right: The sand drag has narrow steel paddles attached to the chains and the axle of the large-diameter pulley is above water level.

chutes, very little gold is recovered nowadays, attesting to the thoroughness with which the gold miners worked and re-worked the gravels of the ancient river bed forming the Mother Lode. The Lode itself threads its way through the arroyo where the plant is located and the stillness today is broken only by the rattle of the gravel plant. Old timers recall the roaring 'eighties, however, when 4,000 miners sweated and swore up and down Chile Gulch in their quest for gold.

Dump trucks loaded by a small power shovel in the pit discharge their loads over a 6-inch grizzly into a 24-cubic yard steel hopper at the plant. A 30-inch by 7-foot variable-speed belt feeder transfers the bank-run material to the plant belt which is 24 inches wide on 60-foot centers. The feeder is equipped with a manual control lever to regulate the feed to the main belt. Carried upward, the conveyor discharges to a 3- by 12-foot spring-mounted vibrating screen carrying ¼-, ⅜-, ¾-, and 1¼-inch mesh panels. All sizing and washing is accomplished on this single-deck unit, Binks spray nozzles washing the material. Throughs are chuted into three separate truck-loading bins and the fine material passes to the sand drag. The minus-¼-inch fines are processed for concrete sand and this panel is changed to one with ⅛-inch mesh when plaster sand is desired.

Oversize, normally running from 1¼ to 4 inches in size, is carried over the screen to a 6-cubic yard reject bin which feeds the Kue-Ken crusher. The crusher is in closed circuit, the return being via a 35-foot belt-bucket elevator equipped with 6- by 10-inch buckets, to the main belt.

Only two men are required to operate the plant, even at capacity operation, one loading and operating



The vibrating screen, designed and built by the Neilsens, does all the sizing, scapling, and sand extracting.

the pit truck and bulldozer, the other looking after the plant proper. Much of the output finds its way into road construction or maintenance in Calaveras and Amador Counties although the demands of general construction are currently taking practically all the plant can produce. Some of the finished material is delivered by the Neilsen fleet of three 4-cubic yard Dodge dump trucks.

Water is provided by a 2-inch Sterling and a 2-inch Fairbanks-Morse pump operating in a 10-foot sump in the creek bed near the plant. These units can supply the 250-g.p.m. needs of the plant except during the dry summer months and another well is being driven several hundred feet distant for auxiliary service during this period. The low-lift pump at the new well will discharge into the sump which supplies the two 2-inch pumps.

Although the plant was built only last year, the Neilsens are old hands at this business of producing sand and gravel. The elder Neilsen first dug and delivered bank-run material with scrapers and wagons, drawn by horses and mules, back in 1918. He was in and out of the gravel business up until 1937, engaging in gold mining and dredging in the interim, when he erected a modern washing-and-screening plant near San Andreas. This plant, fed by a slackline cableway, was taken out of service last year when the new plant began producing. However, the older plant is to be rebuilt late this year or early next year.

Clinton and R. E. Neilsen standing by one of the company's dump-trucks.

U. S. Industrial Safety Record Improved in 1944

The safety record of nonmetallic mining as measured by the number and frequency of injuries per million man-hours of exposure to hazards was better in 1944, than in 1943, according to a report by the Bureau of Mines. Seventeen fatal and 1,283 non-fatal lost-time injuries occurred in 1944, compared with 25 fatal and 1471 non-fatal injuries in 1943. The fatality rates of 0.75 per million man-hours at underground mines, and 0.47 at open-pits were better than the corresponding rates of 0.90 and 0.88 in 1943. Non-fatal injuries at underground mines declined from a rate of 52.28 per million man-hours in 1943 to 50.16, whereas the frequencies at open-pits increased from 42.53 in 1943 to 49.08 in 1944. The reduction in the number and frequency of injuries was accompanied by a shrinkage in the size of the total working force.

Blast-Furnace Slag Output In 1945 Over 12,000,000 Tons

In 1945 the output of commercialized blast-furnace slag totaled 12,635,868 tons, 2 per cent. more than the 12,405,992 tons reported in 1944. Sales of air-cooled slag increased 3 per cent. These statistics are based on a canvass, conducted by the National Slag Association, of the 32 companies that prepared blast-furnace slag for commercial use. The results of this canvass were assembled in cooperation with the U. S. Bureau of Mines.

Practically all of the commercial production is east of the Mississippi River, chiefly at steel centers located in Ohio, Alabama, Pennsylvania, and Illinois. Shipments, however, are made into all states east of the Mississippi except some of the New England states outside the economic range of sources of supply.

An outstanding development is the increase in production of lightweight slag for use in building construction. To meet the insatiable demand for building materials in the latter part of 1945, installation of concrete block plants reached a record rate. As they began to operate, the demand for lightweight aggregates grew in proportion.

Oxy-Acetylene Rebuilding Prolongs Life of Drill Hammers*

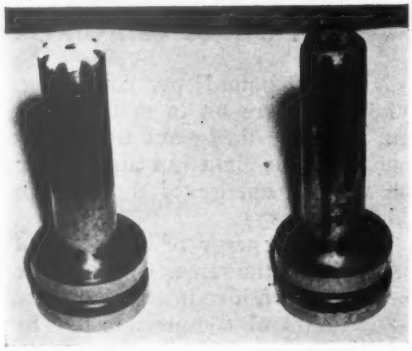
THE hammer of an air drill used for digging ore from the natural deposits takes a terrific beating —1800 times a minute it hits the drill steel with a 40-lb. blow. It's a rugged job and a costly one when new hammers last only 150 shifts before they are discarded.

Such hammers, once destined for scrap piles at the rate of thousands per month, are now repeatedly given new life by oxy-acetylene welding. The salvage procedure developed by one lead mining company is so successful that the company has not purchased a new hammer in two years. Unit reclamation averaged about 20 per cent of the cost of a new hammer. Moreover, repaired hammers last as long as new ones and are salvaged again and again, at a tremendous saving.

As the first step in reclamation, all the defective or battered metal is ground off the worn hammer. Care is taken to prevent overheating while grinding, since this will affect the performance of the rebuilt hammer. The hammer is then slowly heated to the welding temperature, and if any checks or cracks appear at this time more grinding is done. This is necessary because any attempt to fuse below these defects will result in a wide fluctuation in the hardness of the metal after heat-treatment.

After the hammer is ground, it is built up with a suitable metal such as "Oxweld" No. 6 CM steel rod while being held in a 45-deg. position, as shown in the illustration. An excess acetylene flame is used to develop maximum hardness. All the added metal is carefully and thoroughly fused, since complete penetration of weld metal is necessary to prevent spalling in use. After the hammer is welded, it is cooled in lime, ground to length, properly shaped, and then polished before being heat-treated.

In heat-treating the rebuilt hammers, the end of the hammer is heated to 1,550 deg. F. in a thermostatically controlled furnace. The piston is also heated to about 1,100 deg. to prevent the hammer from breaking near the piston when it is quenched. If a great deal of metal has been deposited, heating the hammer to 1,600 deg. may be necessary to develop the desired hardness. The heated hammer is then quenched in water for one second. The remainder of the quenching is done with a very thin heat-treating oil, a method that produces the proper amount of tempering. Finished hammers are tested with a Scleroscope for hardness, and must test from 80 to 85 to give satisfactory service.



Right: Before grinding. Left: Welded hammer ready for grinding to size.

Continual use of a repaired hammer eventually wears down the pistons so that compression is lost in the machine. The piston is then reclaimed by grinding down the worn area 1/8 in. and building up with Oxweld No. 31T bronze rod or other suitable metal.

Courtesy Linde Air Products Company.

$500,000 Improvement For Puerto Rican Plant

David S. Ramirez, general manager of the Puerto Rico Cement Corporation, of San Juan, Puerto Rico, has announced that his company is spending approximately $500,000 on improvements which will increase production to 1,000,000 barrels of cement per year. A new Allis-Chalmers rotary kiln, 8½ by 10 by 8½ by 300 feet, is expected to increase the daily output by 1500 barrels, and a Dixie Mogul hammermill, Model 5050, is to be installed to crush 250 tons of limestone per hour. A 2½-cubic-yard Bucyrus-Erie electric shovel has been purchased for the quarry, and three new Easton 10-cubic-yard trailers will be used to haul the limestone to the crusher.

Packing facilities will be expanded by the extension of the present packhouse and the installation of No. 111 FC Bates 4-tube valve bag packing machine. Storage capacity has been doubled by the construction of five new silos.

Million Dollar Plant Fabricates Nevada Gypsum

A new $1,000,000 gypsum company, which will calcine and fabricate Nevada gypsum deposits, will start production within the next 60 days, according to a report from Las Vegas, Nev. The new firm, known as the Alpha Gypsum Company, was incorporated by Calvin Cory, Las Vegas attorney; George Hauptman of Los Angeles, and M. A. Hougen, Los Angeles mining man. The new plant will employ about 75 men to start.

Mr. Hougen reports the firm contemplates the production of wallboards, plaster, stucco, bricks and other building materials by a new process at reduced costs. Through the new process, firing of the bricks is eliminated and the bricks are ready for building within an hour after coming out of the machine.

The deposits near the plant are said to contain high grade raw gypsum and are estimated to contain 150,000,000 tons. The company plans to eventually to expand to other parts of Nevada.

Right: Steel rod being used to build up worn air drill hammers.

THE LIME PLANT OPERATOR

BY WOLF G. BAUER

FAN TECHNOLOGY
PART I—Draft Gages and Connections

Wolf G. Bauer

OF all the material - conveying appliances found in the average lime plant, the fan or blower is one of the most widely applied machines, yet also probably one of the least understood in its relation to gas movement. The lime plant operator employs fans to pull or push combustion air into his kilns; to exhaust kiln waste gases; to re-cycle hot gases for burning control; to pick up ground limestone or lime for air separation in cyclones; to clear grinding mills of fine material during grinding; to pull dust-entrained air through scrubbers and washers for cleaning; to transport fuel gas to burners; to induce air with high-velocity gas streams; to force air, steam, and CO_2 gases through producer beds; to bring cooling air to hydrators; to transport lime or coal from bins to cars; to ventilate dusty or smoky buildings; to sort core in mechanical core sorters; and to carbonate or aerate water or milk of lime for precipitated whiting.

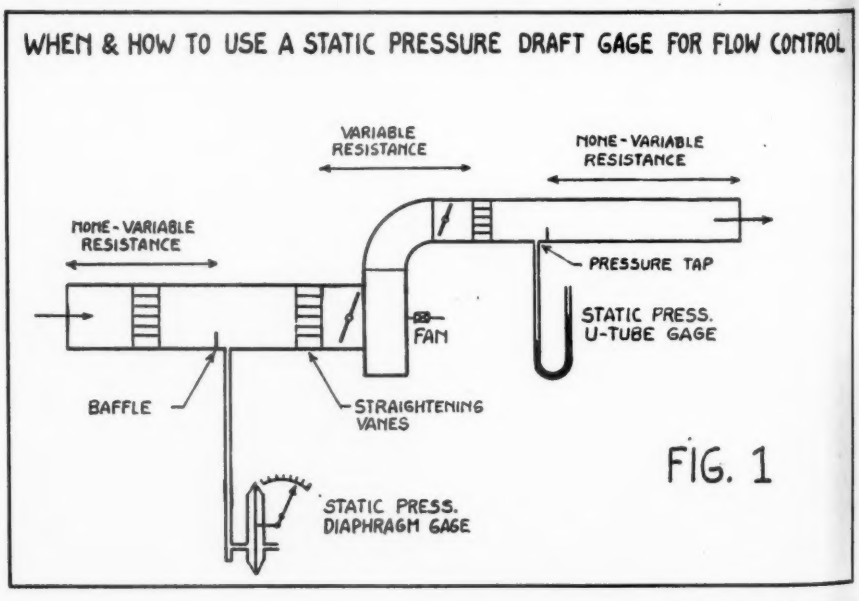
Fan engineering is by no means a simple science, and we will be able to only scratch the surface in these discussions. To apply fans intelligently to any particular job requires some basic knowledge and understanding of the physical laws governing gases in motion and under varying pressure conditions.

Gases in Motion Because gases are invisible, it is somewhat more difficult for the average person to attribute to them such properties as weight, mass friction, specific gravity, or elasticity, i.e. compressibility. Every gas or combination of gases, like air for example, has a certain weight per unit volume. This is its density. Air, for instance, under standard conditions of pressure and temperature (generally 70 degrees F. and 1 atmosphere) weighs .075 pounds per cubic foot. When gases are set in motion by a fan, the force they exert is not only due to their weight but also due to the velocity energy of that weight (kinetic energy).

The total energy of a stream of gas is always the same. (In this case we do not consider heat energy due to friction and compression.) The manifestation of this energy is in the gas pressure which we can measure. Generally two pressures are considered, the pressure due to velocity (impact) alone, and the pressure due to the compressing or expanding effect of the fan on the gas in the system. The former is termed velocity pressure, the latter static pressure. The total pressure is the sum of these two. Gas flow can be determined by measuring either one or both, the choice depending on the relative gas velocity, duct size, and allowable constrictions.

Does Your Draft Gage Measure Draft Many practical plant men, kiln operators, and persons responsible for installing and operating fans, or controlling the flow of gases with fans, seem to labor under the impression that there is something mysterious or very technical in the terms static or velocity pressure. There are still too many individuals who associate the term 'draft' with moving gases, and who see in a simple draft gage a measurement of gas flow. Due to this misconception of 'draft' we find many faulty measuring and control installations from which erroneous conclusions are drawn. No doubt much of this misuse of the term draft, when applied to the readings of a static pressure gage ('draft gage') stems from the use of the word in expressions such as "close the door, I feel a draft," denoting draft as the condition of a current of air moving through the door. However a draft gage does not measure such a movement of air or gas, any more than a barometer measures wind velocity. It simply measures the differences in pressure (or density) between the gas at the measuring point and the air outside. There are times and installations where such a gage reading will correspond with relative gas flow, but we must be very sure that these readings are entirely due to gas flow or fan pull.

Maybe we can make this point very clear with an illustration. This subject of so-called 'draft' as read by a 'draft gage' is fundamental. It is important that every operator is



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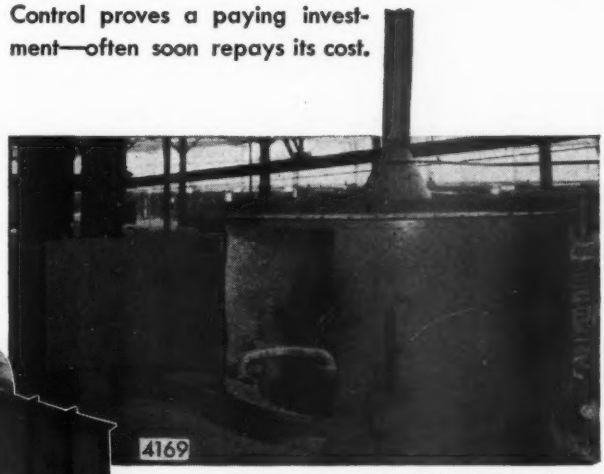

Many dry pans are made dustless by housing completely, as shown, and all dust collected by Sly Dust Filters (illustrated in top view.)

Sly Dust Collectors get all the dust by filtration through cloth. The Collector shown here filters silica dust out of 15,000 cu. ft. of air per minute.

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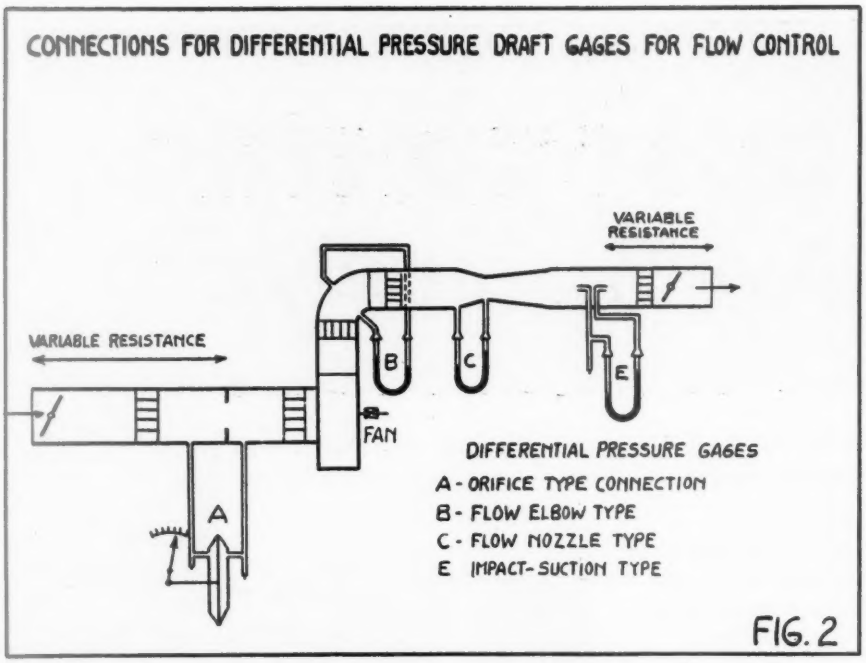


entirely clear on it before we go further. Let us picture a fan pulling air through a straight pipe. One end of this pipe or duct is open, the other is connected to the fan inlet. The fan outlet or discharge opening is fitted with a damper or gate by which we can control the quantity of air pulled through the inlet pipe. If we now place a small pipe at right angles into this duct or pipe and connect it to one side of a U-tube or diaphragm-type gage, we find that as the air damper in the fan discharge is opened from a closed position to a full open position, the draft gage will read successively higher 'draft' or suction. Since we know that more air is moving through the inlet pipe or duct with each increase in damper opening, we logically conclude that the draft gage certainly indicates very plainly the draft or relative quantity of current flowing through the inlet pipe.

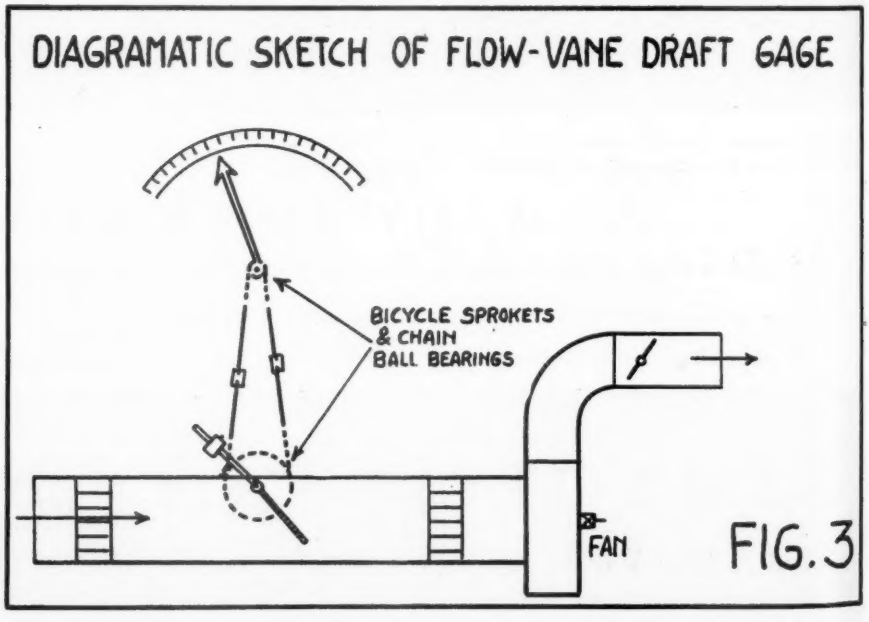
But that is not the whole story. Let us now leave the damper in the fan discharge opening wide open, and install a damper at the open end of the inlet pipe for controlling the amount of air pulled through this pipe past the measuring point. As we slowly close this damper from a full open position to a closed position, the draft gage, instead of indicating a lower draft reading with each further closing movement of the damper now indicates even higher draft readings. In fact, when the damper has been completely closed and no air at all is flowing through the inlet pipe to the fan, our draft gage shows the highest reading. By this time we must surely have come to the realization that our so-called 'draft gage' is really only a pressure or vacuum measuring gage, the readings of which have no relation whatsoever to the flow of gases past the measuring point. So let us remember,—a draft gage connected to your stack, boiler, kiln, cooler, mill, gas producer, or what not does *not* indicate flow, but simply the pressure difference between the outside atmospheric pressure and that of the gas at the measuring point, and this reading may or may not be due to change in gas flow or velocity.

In any gas-flow system actuated by a fan, such a fan is the division point between negative pressure (suction) and positive pressure. If we use a 'draft' or pressure gage for indicating relative changes in draft or flow of gases, then we must place the measuring connection (pressure tap) of the gage on that side of the fan in which there are no possible changes or variations in flow channel area (i.e. resistance) between the measuring point and the gas inlet or outlet to or from the system, as the case may be. If variations occur on both sides of the fan, such as changes in resistance due to height of ash, lime, or stone bed, plugging due to dust accumulations, rings, mill load, temperature, etc., then a static pressure gage is unreliable for use as a draft or relative flow meter. See Figure 1.

Methods of Gas Flow Measurement

In controlling the flow of gases, it is unwise to depend on damper or slide settings. Very seldom is a fine adjustment possible with these, and any changes in resistance of the gas passages ahead or behind of the gate, or changes in gas density due to temperature, will nullify any previous settings. To control gas flow accurately and consistently, flow must first be measured. Now it is not at all important to measure the *actual* quantitative flow in cubic feet per minute, for instance. The vital point is to measure the *relative* flow accurately. We are not so concerned with quantitative measurements as we are with qualitative or relative measurements, so that gas flow changes can be detected and corrected, regardless of the actual flow values involved.

There are several methods of measurement available to the operator. We may group them under three principle types for simplicity's sake. The most common, but by far the most accurate and misapplied method, namely the static pressure method, has already been mentioned. Its use is only justified in



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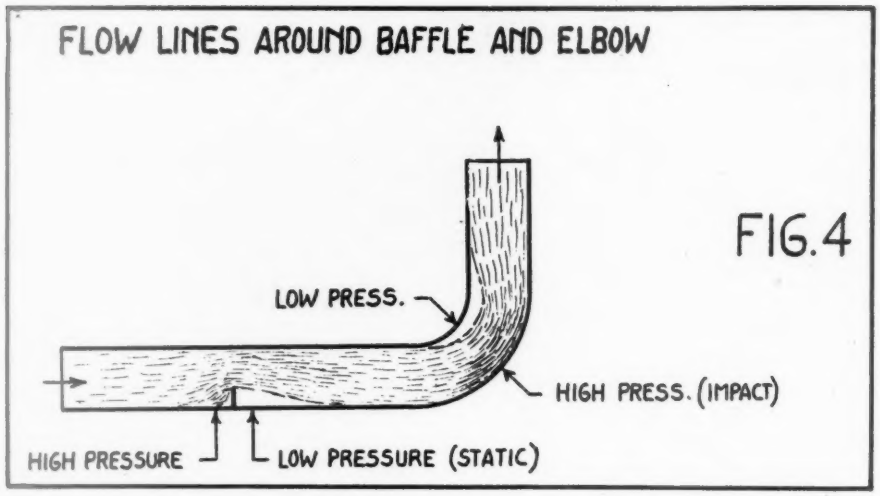

those cases where the measuring point is so located that readings therefrom are not influenced and counteracted by conditions other than gas velocities.

The second method may be called the differential method in which we measure the pressure drop through a constant resistance or restriction in the gas passage. Instead of measuring the difference in pressure between the gas in the system and the atmosphere outside the system, this measurement takes into consideration the fact that the static pressure is partly converted to velocity pressure when constrictions in the gas passage change the speed of the gas current. Elbows, orifice plates, or flow nozzles may be used. If an elbow or sharp bend is already incorporated in the duct system, then this is the simplest method, and one that presents no further resistance to the gas flow. If correctly engineered, this method will allow actual volumetric values of flow to be read from differential gages. See Figure 2. Pitot tubes may also be used for this purpose, but because of their greater plugging tendencies for permanent installations will not be further discussed here.

The third method employs the flow-vane or swing-damper which is moved into certain positions by the gas impact pressure just as the wash on the clothesline indicates the relative wind velocity by its position or angle from the vertical quiescent position. Figure 3 shows the arrangement the writer has used for such a gas-flow indicator. For the practical operator with a flair for home-made gadgetry, this gage will satisfactorily take the place of a higher-cost differential diaphragm gage as it is more easily read, can be adapted to any size or velocity gas moving system, is less subject to eddy currents, automatically indicates density variations as its operation is a function of mass velocity, and decreases, rather than increases, flow resistance with higher velocities.

Draft Connections Since the measuring gage is generally located on a control board at some distance from the measuring points or 'pressure taps,' it is necessary to connect the taps with the gage by means of pipe. One-eighth inch or ¼ inch pipe may be used. Joints should be tight, threads well sealed, and all bends made with tees and clean-out plugs. Valves must be interposed before the line enters the gage. In order to protect the gage during pipe cleaning, as well as to allow the pointer to be set at zero starting adjustment, the use of such valves becomes necessary where these are not incorporated in the gage inlets. Final connections can easily be made by means of a 12-inch section of rubber garden hose instead of a regular pipe union in order to facilitate blowing out of the lines, and to eliminate any possible vibrations that may be transmitted to the instrument. By using, for instance, a ¼ inch coupling at the ends, a garden hose will strip over this quite tightly without need for clamps or unions.

The ends of the pipes projecting through the walls of the gas ducts (pressure taps) must enter the duct at right angles, and should be flush with the inside duct surface. Their location with reference to the constriction or duct bend, across which the pressure drop is measured, is shown in Figure 2. Formulae for computing actual gas flow can be found in most engineering handbooks. Since we are not dealing with testing installations but permanent control application, the illustrations of the pressure and stream line conditions for accurate measurement (see Figure 4) serve to supply us with sufficient hints as to how we may place our pressure taps around any obstruction of our own design to measure only relative gas flow for control purposes. For our needs, constrictions do not have to be particularly extreme at the expense of power. However, it is necessary to guard against undue turbulency set up by nearby duct bends, dampers, bleeders, or fan rotation. In all cases it is extremely important to straighten out and steady the flow of gas past the pressure tap locations. This can readily be accomplished by fixing flow-straightening vanes at a short distance upstream and downstream from the taps. These vanes may be short lengths of pipe of smaller diameter filling the duct crossection, or simply flat metal strips in egg-crate style. If taps are located in relatively long, straight duct sections, no flow vanes are required.

W. W. Mein, Oliver Bowles On 1947 A.I.M.E. Ticket

Among the nominees on the official ticket for president, vice-presidents, and directors of the A.I.M.E. for 1947, are William Wallace Mein, Sr., president of the Calaveras Cement Company of San Francisco, and Oliver Bowles, chief of the nonmetallic economics division of the Bureau of Mines, Washington, D. C. Mr. Mein, a graduate mining engineer from the University of California, has managed several gold mines in South Africa and served as consultant to others. He has also been associated with nickel mining in Canada and with oil production in California. His son, William Mein, Jr., is now secretary of the San Francisco section of the Institute.

Dr. Bowles was born in Canada, graduated from the University of Toronto, and received a Ph.D. degree from the George Washington University. He joined the Institute in 1914, and has had several papers published by the Bureau of Mines and the Institute. He also has served as vice-chairman of the editorial board for the special volume, *Industrial Minerals and Rocks*, and is now acting in the same capacity for a new edition.

The Lycoming Silica Sand Company of Montoursville, Pennsylvania, has purchased the quarry and crushing plant of the Lime Bluff Company, Muncy, Pennsylvania, and will remodel it and install more machinery as fast as equipment becomes available. Quarry operations began at Lime Bluff in 1920. In 1930 H. H. Wilson and Charles C. Hartsock acquired the property from Winston Brothers Company and have operated it until the present.

At Coplay, Pennsylvania, the Coplay Cement Company has donated 12 acres of land to the public for use as a community center and playground. The company will aid financially in the work of grading and laying out a baseball field and equipping a playground and swimming pool.

Agricultural Limestone Plant of L. W. Hayes, Junction City, Kansas, powered by a MURPHY DIESEL ME-6, 5¾" x 6½", 6-cyl., 135 HP continuous, 160 HP intermittent.

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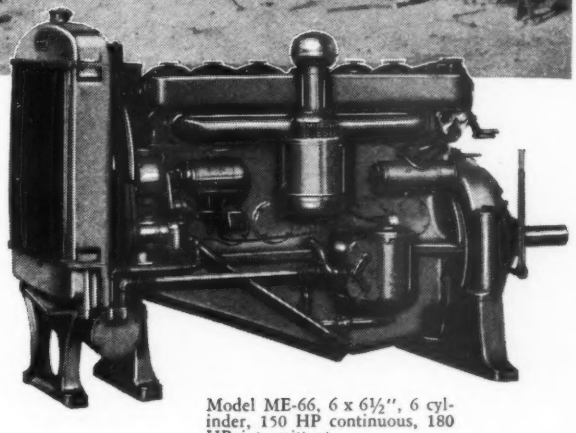

Model ME-66, 6 x 6½", 6 cylinder, 150 HP continuous, 180 HP intermittent.

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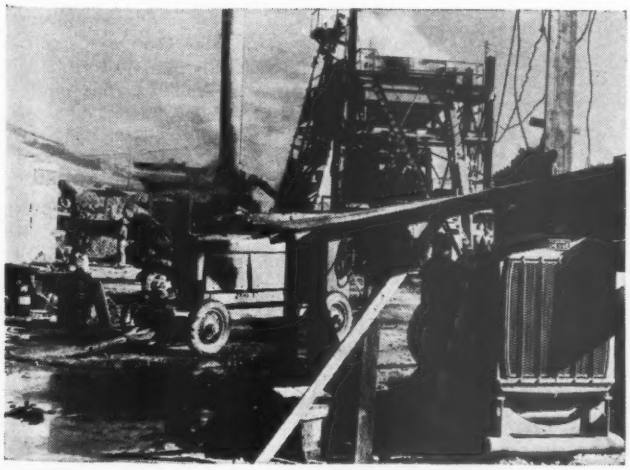

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PERSONAL MENTION

E. F. Haberkern

We are happy to present herewith a portrait of E. F. HABERKERN, whose recent appointment as assistant to the president of the Columbia Quarry Company of St. Louis was announced in the July issue of PIT AND QUARRY.

Mr. Haberkern had been a member of the National Supply Company staff (Superior Engine Division) of Philadelphia since 1934.

HUGH G. BOUTELL, who has been chief of the information section of the National Bureau of Standards, since 1919, retired from his duties on May 31. Mr. Boutell had also acted as editor of the bureau's *Technical News Bulletin*, which was developed under his direction from a mimeographed bulletin to its present status. He was the author of a report on the war work of the bureau during World War I and also of articles on the bureau's activities in other publications.

Frank Moyle

FRANK MOYLE, former general superintendent of the Marquette Cement Manufacturing Company, has been made director of operations. Mr. Moyle has been affiliated with the Marquette company for 33 years, and is a member of a family that has long been prominent in the cement manufacturing industry and associated with the Marquette company since its founding nearly 50 years ago. He is responsible for many improvements in cement manufacturing processes.

WILLIAM E. IRWIN, formerly director of labor relations for North American Aviation, Inc., of Kansas City, has joined the Marquette staff as assistant manager of industrial relations. Prior to his connection with North American Aviation, Mr. Erwin was assistant employment manager for the Ford Motor Company at Kansas City, Mo.

ARTHUR BEVAN, state geologist of Virginia, has been appointed chairman of the Division of Geology and Geography of the National Reasearch Council for a three-year term, beginning July 1, 1946. He succeeds William W. Rubey of the U. S. Geological Survey, whose term had expired.

FREDERICK C. ABBOTT, formerly manager of the New Products Division of the Pennsylvania Salt Manufacturing Company, of Philadelphia, Pa., has been named assistant production manager of the manufacturing department. Mr. Abbott, a chemical engineering graduate from the University of Arkansas, left the Phosphate Mining Company in 1943, to join the Pennsalt company; he has also been associated with the Ozark Chemical Company and the Texaco Salt Company. He is a member of the American Chemical Society, the American Institute of Chemical Engineers, and the Franklin Institute of Philadelphia.

HUGH RICHARD BISHOP, recently released after four years of service as a lieutenant colonel in the air forces, has been named manager of the New Products Division, replacing Mr. Abbott. Mr. Bishop, a Lehigh University graduate and member of the Mining and Metallurgical Society and Phi Gamma Delta, joined the company in 1939. MARTIN E. JOHNSON has been transferred from the market research department to the New Products Division.

George L. Kirp

W. A. Wecker, president of the Marquette Cement Manufacturing Company, announced the appointment of GEORGE L. KIRP as operations engineer. Mr. Kirp, a Purdue University graduate, has been prominently associated with the cement industry since his graduation. His past affiliations are as follows: Indiana Portland Cement Company; chief chemist, National Cement Company, of Birmingham, Ala.; chemical engineer, Kosmos Portland Cement Company; Louisville, Ky.; chemical engineer and assistant superintendent, Petoskey Portland Cementy Company; superintendent, Green Bag Cement Division, Pittsburgh Coke & Chemical Company.

The Celotex Corporation announces the following personnel changes in the company's Sales Division:

E. C. RAUTENBERG has been appointed assistant general sales manager, with headquarters in Chicago. He is succeeded by E. E. DIERKING. GEORGE J. DINGES, recently discharged from the United States Army, has resumed his position as manager of the Celotex Atlanta branch. ALLEN CASSIN, who succeeded Mr. Dinges at Atlanta during the time he was in service, becomes manager of the Cleveland branch.

C. STEWART PARSONS has been recently appointed Chief of the Bureau of Mines, Ottawa, Canada. He has been Chief of the Metallic Minerals Division of the Bureau since 1936.

MARION D. ROSS, formerly district engineer of the Kentucky State Highway Department, has become executive secretary of the Plantmix Asphalt Industry of Kentucky with headquarters in Frankfort, Ky.

OBITUARIES

S. M. Shallcross

SAMUEL M. SHALLCROSS, former general manager of the Bellefonte, Pennsylvania, interests of the Warner Company, died unexpectedly at his home in Chatham, New Jersey, on June 28 at the age of 53 years. Mr. Walton was also vice-president and treasurer of the Walton Laboratories of Irvington, New Jersey. Recently he had been an industrial consultant.

His association with the Warner company began in 1923, when he became assistant to the general manager. Later he was made general manager, a post which he held until 1942.

O. C. HART, chief chemist for the Monolith Portland Cement Company, of Los Angeles, died recently. Mr. Hart had been associated with the company since 1932. Regrets of his passing are expressed by the company and his many friends.

GEORGE E. LEWIS, 68, assistant treasurer of the Lone Star Cement Company of Nazareth, Pennsylvania, from 1923 until his retirement in 1944, died on July 15 at his home near Easton, Pennsylvania.

JOSEPH M. PUSEY, 65, general manager of the Wilmington Division of the Warner Company, died unexpectedly in Wilmington, Delaware, on June 21. Mr. Pusey and his brother founded the Edward R. Pusey Company, of which he became president in 1926. Four years later the firm merged with the Warner Company, and Mr. Pusey was made general manager of the Wilmington Division.

WILLIAM B. HOWAT, 79, who was for many years associated with the J. E. McCracken Sand & Gravel Company of Newport, Kentucky, died on June 30 in a Cincinnati hospital.

IRIE BROWN, an employee at the quarry of J. & L. Snouffer, Inc., Columbus, Ohio, died on July 6 as the result of an accident at the pit. Mr. Brown was electrocuted when he grasped a power line while standing on the top of a steam shovel.

Legal Decisions

By LEO T. PARKER

During the past few weeks the higher courts in the United States rendered several interesting and important decisions, knowledge of which will importantly assist readers to prepare to win law suits. Present unusual conditions require that manufacturers and sellers of nonmetallic products keep abreast with modern law, particularly because many new decisions modify or reverse the recognized law of only a short time ago.

Owner Gives Orders

Under all circumstances when a property owner instructs or orders a contractor how to do work such owner must pay the contractor the full agreed contract price, although the finished job is "unsatisfactory", or public officials refuse to approve the job.

For example, in *Miller v. Stump,* 46 Atl. (2d) 331, reported July, 1946, the testimony showed that city officials established the grade for sidewalks, and an ordinance required a fall or decline to the curb, at the street, on all sidewalks of about one-half inch to the foot.

A cement contractor contracted with a property owner to lay a sidewalk. Under the terms of the contract the contractor agreed to perform the work in a manner "satisfactory" to the owner.

Later the property owner instructed the cement contractor to construct a sidewalk with a degree of slant not in accordance with the city ordinance. When the job was completed the city officials refused to approve it. The property owner refused to pay the contracter the agreed contract price and the contractor sued for payment. In holding in favor of the contractor the higher court said:

"Defendant (property owner) having assumed responsibility for the variance from borough specifications, cannot avoid paying the contract price for work done as he directed it."

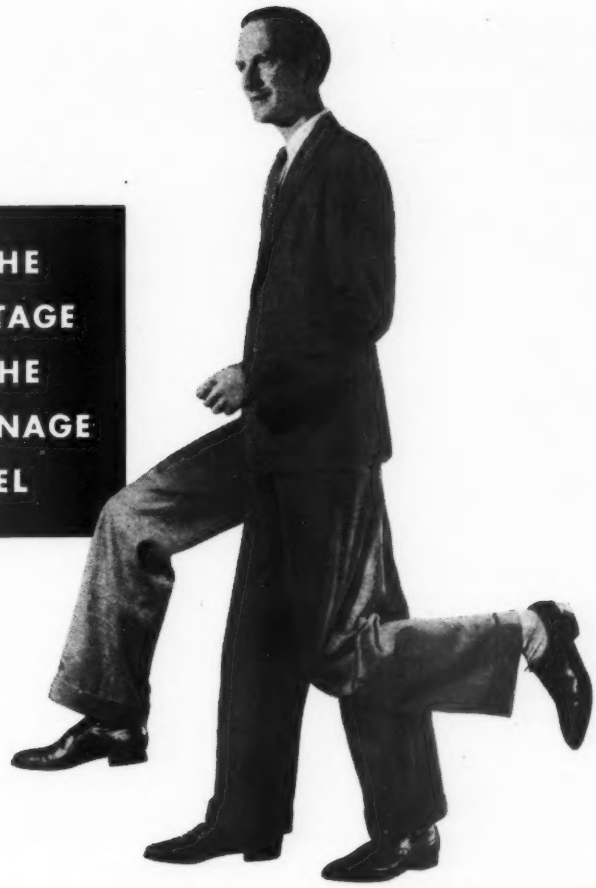
Law of Slander

Modern higher courts consistently hold that an employer cannot be held liable for slander or libel unless the testimony proves that some person or persons heard or knew of the alleged slander or libel, against an employee.

For illustration, in *Montgomery v. Allison,* 178 S. W. (2d) 302, it was shown that a legal agent, as official, of a company said that he had caught an employee of the company stealing. There were no witnesses present except another company official. Although the lower court held the company liable for slander, the higher court reversed the verdict, and said:

"There must be averments that third persons understood the language as conveying the alleged defamatory meaning."

On the other hand, see *All,* 23 N. W. (2d) 247, reported July, 1946, where the higher court held a company liable for libel because an official dictated a defamatory letter to a stenographer. No



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one except the latter and the addressee read the letter, but the higher court held that the stenographer's knowledge of the contents of the letter was sufficient basis for libel.

Exposure to Disease

All states have laws which require employees to file claims for compensation within a definite period after last exposure to the disease of silicosis. A recent court held that "last date of exposure" is the last day of employment.

For instance, in *Square D Company v. O'Neal,* 66 N. E. (2d) 898, reported July, 1946, the testimony proved that an employee seeking compensation for disability due to occupational disease of silicosis had been in continuous employ of his employer from 1928, to January 22, 1945, when he became temporarily disabled on account of silicosis. Thereafter he resumed work and worked until November 1, 1945, when he ceased work entirely. In holding the last of exposure to be November 1, 1945, and that the employee was entitled to compensation, the higher court said:

"The findings expressly show that appellee's (employee's) disablement was the result of his exposure to the disease of silicosis during his continuous employment and that the disablement occurred on January 22, 1945, although he was able to do some work thereafter until November 1, 1945, when he was compelled to quit his employment as a result of the disease."

Date of Disability

Modern higher courts consistently hold that dependents of an employee, who contracts silicosis, are entitled to recover compensation under the State Workmen's Compensation Act from the date of his disability.

For example, in *Thomas v. Continental,* 23 N. W. (2d) 191, reported July, 1946, it was disclosed that an employee was partially disabled on December 7, 1939, from pneumoconiosis contracted while sand blasting. He was removed from this job and given other work, and became totally disabled on June 13, 1943, and died on April 14, 1944, as a result of the pneumoconiosis. The higher court held that the employee's disability was due to the nature of his employment as a sand blaster and allowed compensation to his dependents, from June 13, 1943, under the State Workmen's Compensation Act.

Also, see *Rueter v. Rinshed Mason Company,* 303 Mich. 550, which involved the right of a widow of a deceased employee to dependency compensation for silicosis resulting in death. The higher court held:

"We are led to the conclusion that the department erred in not fixing compensation at the time of disability."

Mine Caves In

Considerable discussion has arisen from time to time over the legal question: If a company leases from its owner property what damages may the latter recover for negligent use of the property?

For example, in *Reed v. Consolidated Feldspar Corporation,* 23 N. W. (2d) 154, reported July, 1946, the question presented the court was: Where a mine cave-in was caused by lessee's negligent and unworkmanlike mining was the cost of removing the muck and rock the proper measure of damages recoverable from the lessor or owner of the property? The higher court held:

"We think that the measure of damages is the reasonable cost of restoration, unless such cost is greater than the value of the leased premises, in which case the difference is market value before and after the injury would be the proper measure of damages."

Immediate Notice

All casualty and liability insurance policies contain a clause that in the event of accident the assured shall give prompt written notice to the company.

In *Ace Company v. Indemnity Insurance,* 152 Fed. 336, it was shown that an insured named Ace held a liability insurance policy which contained a clause of this nature. Ace failed to notify the insurance company until more than 3 months after the occurrence of an accident. However, the higher court held that the delay of 3 months did not invalidate the policy, because the injured person was not his employee and he had no idea that this injured person would sue him. This court said:

"Failure to give any notice required to be given by the terms of a policy of insurance, within the time specified therein, shall not invalidate any claim made by the insured, 'if it shall be shown not to have been reasonably possible to give such notice within the prescribed time and that notice was given as soon as was reasonably possible.' "

But, in *Sweeney v. Travelers' Insurance Company,* 165 N. W. 775, a delay of more than six months in giving notice of an accident under a policy requiring "immediate written notice" was ruled too long. Recovery on the policy was denied.

Broad Damages

Generally speaking, a damage judgment against a negligent truck driver employed by seller of nonmetallic material may include all damages sustained by the injured party.

For illustration, in *Kentucky Company v. Campbell,* 186 S. W. (2d) 409, it was shown that a driver named Campbell was driving his truck to which was attached a 23-foot trailer. A truck and 20-foot trailer owned by a corporation was being operated on the left side of the highway collided with Campbell's truck. Campbell sued for heavy damages. The higher court held that Campbell was entitled to recover an amount of damages from the corporation including his personal injuries, loss of use of the truck and trailer, cost of repairs, and permanent injury to the truck and trailer.

Verbal Agreement Valid

Modern higher courts consistently hold that a verbal employment contract is equally as binding as a written employment contract, if the contract can be performed within one year.

For illustration, in *A.A.A. v. Barr,* 186 S. W. (2d) 825, a lawyer sued a principle corporation to recover $1,000 per month for legal services alleged to have been verbally promised him for several months during 1942. The jury was asked to decide whether the directors of the principle corporation had made a verbal agreement with the lawyer to pay him one thousand dollars per month in cash for legal services? The jury decided in favor of the lawyer, and the higher court approved the verdict.

Real Intentions

Under all circumstances a sale contract must be fulfilled strictly according to the "intentions" of the buyer and seller when the contract was made. A written contract may not be conclusive, as to the real "intentions" of the parties.

For example, in *Funkhouser Equipment Company v. Carroll Gravel Company,* 168 Pac. (2d) 918, reported June, 1946, it was shown that the Carroll Gravel Company entered into an agreement in writing, whereby a seller sold a used "Brown Hoist Crane on Crawlers" for $2,500. The machine was delivered but the Carrol Gravel Company only paid $500. The seller sued for the balance.

During the trial the counsel for the gravel company proved that its officials signed the written contract on October 28, but that on October 18, they had purchased the Crane under a verbal agreement. On this latter date they explained to the seller that they had no experience in the use of cranes and needed it to do the heavy lifting necessary in the production of sand and gravel, and that it was necessary that it could be moved from place to place on its own power so it could be used at both sand and gravel pits. When the crane was delivered it was so defective it could not be moved on its own power from place to place and was not capable of lifting a greater load than five tons.

Although the seller contended that the Carrol Gravel Company was obligated by the terms of the written contract, the higher court held otherwise and said:

"Where a written instrument is signed by the mistake of one party caused by the fraud of another it may be reformed to state the real agreement of the parties."

In other words, this higher court held that irrespective of the contents of a written contract the contracting parties are bound by verbal agreements made before the written contract was signed.

Ownership of Land

Modern higher courts consistently hold that where a body of water is not navigable the owner of land surrounding it owns the land underlying the water and may take sand and gravel therefrom. However, where the water is navigable the owner of surrounding land owns only to the highwater mark, and the land underlying the water belongs to the state.

According to a late higher court decision the test of navigability of a water course is whether the body of water is susceptible of use for purposes of commerce and whether it possesses a capacity for valuable floatage in the transportation to market of the products of the country in which it is situated. It should be of practical usefulness to the public as a public highway in its natural state, and without the aid of artificial means, or it is not navigable.

For instances, in *McGahhey v. McCol-*

lum, 179 S. W. (2d) 661, it was shown that a lake has never been used for commercial navigation. Furthermore, by reason of its inaccessible location, shallowness, and trees growing therein the lake is not susceptible to such navigation. In view of this testimony the higher court held that it is a "nonnavigable lake", and that the lands underlying belong to the owner of the surrounding land. This court said:

"The true criterion of a navigable stream is the usefulness of the stream to the population on its banks as a means of carrying off the products of their fields and forests, or bringing to them articles of merchandise."

Town Liable

Generally speaking, either a state, county or municipality is liable for payment of materials purchased in compliance with valid laws.

For example, in *Atlantic v. Town of Bremen*, 64 N. E. (2d) 220, reported April, 1946, it was shown that the board of town auditors consented to the incurring of indebtedness for purchase of supplies by an overseer of the poor. The town refused to pay the debt, but the higher court held in favor of the seller. However, this court clearly held that if the overseer had not strictly complied with the state laws, the town would not have been liable.

See *Consolidated v. Cass County*, 53 N. E. (2d) 738, where the higher court refused to hold a county liable for payment of materials purchased by the sheriff who failed to comply with a state law which specified that the contract of purchase must be approved by the county commissions.

Must Place Flares

Failure of a truck driver to set flares before and behind a truck disabled on a highway at night-time may result in liability.

For illustration, in *Northwestern v. Wagner*, 61 N. E. (2d) 591, it was shown that a truck had been stopped on the highway at night because of tire trouble. The driver failed to place lighted flares to warn traffic approaching from the rear. A car collided with stalled truck. In holding the owner of the latter liable, the court said:

"A driver on a highway has a right to presume that there will be no truck stalled in the highway ahead of him without lights and without warning flares. . . .)"

Property Owner Not Liable

A property owner is not required by law to assume liability for injuries caused by motor vehicles owned by others.

In *Le Barre v. Pacific*, 154 Pac. (2d) 985, the testimony showed a driver drove a truck upon scales of the Pacific Materials Company, in order to ascertain the gross weight of the truck. After the truck was weighed the driver backed its rear end over the sidewalk and struck a pedestrian who sued the company for damages. The higher court held the pedestrian not entitled to a recovery. The higher court said a property owner is liable only for his own negligence and

ESCO 2¼ yard Cast-Welded Dipper Bucket on Lorain 82, loading rock at Kanawha Airport. Note how ESCO dogleg bail cradles large rocks.

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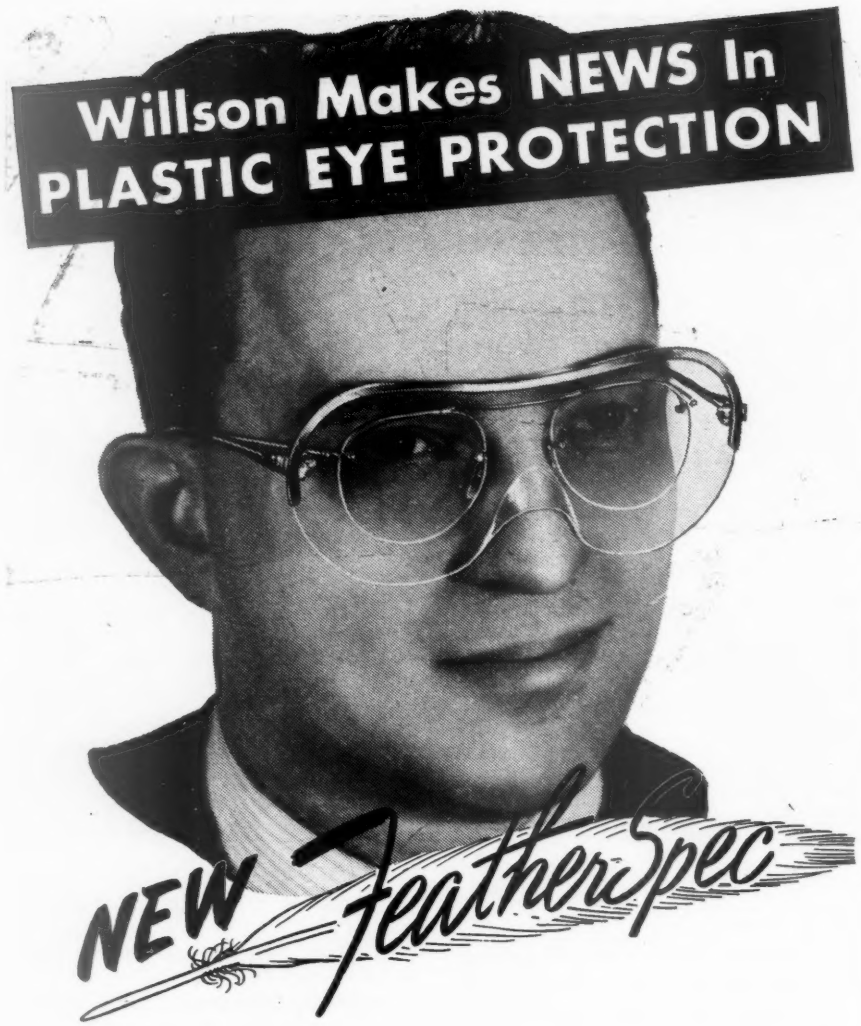

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not for the negligence of strangers and third parties.

Contractor Sets Stakes

According to a late higher court decision a general contractor who sets stakes and gauges must pay the subcontractor for excavation work done accordingly.

For example, in *Dow v. United States*, 154 Fed. (2d) 707, reported May, 1946, it was shown that an excavation contract provided that the work should be performed in accordance with plans which contemplated vertical cutting of a slope. The higher court held the subcontractor entitled to recover extra payment for earth removed from the slope on the basis of slope stakes set by and gauges furnished by the general contractor.

Valuable Consideration

According to a late higher court decision a contract is valid and enforceable although neither party proves that he paid or received "$1 and other valuable consideration" usually recited in a contract.

For illustration, in *Coleman v. Whisnant*, 37 S. E. (2d) 693, reported June, 1946, it was shown that a sale contract contained the usual clause "for $1.00 and other valuable considerations". The purchaser contended that the contract was void because the seller had not paid him $1.00 and other considerations. The higher court held that it was not necessary for the purchaser to prove that he gave the seller any such consideration. This court said:

"At the common law instruments under seal are generally held to be good as against a plea by one of the parties of no consideration, because the seal imports consideration or renders it unnecessary."

Questions and Answers

[Mr. Parker will be glad to answer questions regarding legal problems of PIT AND QUARRY readers. Questions should be addressed to Leo T. Parker, Legal Editor, PIT AND QUARRY.—Ed.]

Legal Editor: I had a very peculiar experience, when I signed my name to a contract for my employer I overlooked putting my employer's name in the contract. Now the seller is suing me. Where do I stand?—C. Q.

Answer: An employee who signs a contract in his own name without disclosing the identity of his employer renders himself personally liable, even though the other party knows that he is acting as agent for his employer unless the employee proves it was the "mutual intention" of all parties that the employee should not be personally obligated.

See *Electric Machinery Company, Inc., v. Block*, 193 S. W. (2d) 631, reported June, 1946, where it was shown that the manager of a corporation purchased a considerable quantity of equipment which the seller charged personally to the manager. Later the manager contended that he was not personally obligated to pay for the equipment because it was used and purchased by another corporation of which he was president.

The higher court held the manager

personally liable to pay for all of the purchased equipment because he failed to prove that the seller knew that he was acting in a representative capacity, and also that the seller had agreed not to expect payment from the manager.

It is well to know that an official is relieved of all risk of personal liability on contracts, or other papers, which he signs with proper authority of his employer, provided: the name of the corporation appears in the body of the contract, or on the letterhead; (2) the word "By," "For," or "Per" proceeds the official's signature; (3) the word "Agent" follows his signature; (4) and the corporation's name precedes the official's signature, as follows: "The White Corporation, By, John Doe, Agent."

Legal Editor: Sometime ago we advertised for bids on construction of a public building. The contractor has sued us for extra work which he claims he did in construction of the lower levels, or basements, based upon our drawings and specifications. We didn't know that so much, or any, rock was to be excavated and the contractor did not attempt to get this information for himself. What do you think we should do?—A. C.

Answer: Modern higher courts consistently hold that contractors may rely upon representations in drawings and specifications. In other words, such representations are in effect warranties upon which the contractor may rely when submitting a bid, and if the representations prove false, erroneous, or unreliable, the contractor is entitled to extra payment for any additional work made necessary by his reliance on such misrepresentations. This rule of law is particularly applicable if the contract contains a clause to the effect that the specifications and drawings form a part of the contract.

For example, in *Furton v. Menasha,* 149 Fed. (2d) 945, reported September, 1945, it was shown that an owner and a contractor entered into a written construction contract. The contractor sued to recover for extra and additional services rendered, basing his claim on a misrepresentation appearing in the specifications, which he relied on when he submitted his bid. This error in the specifications related to the depth at which bed rock would be found. As a matter of fact, bed rock was not found at the depth stated on the map or in the specifications. The lower court refused to hold the contractor entitled to a recovery, but the higher court reversed the verdict, saying:

"The specifications and drawings were in fact made a part of the contract. Also made a part of the record were the instructions to bidders. . . . We are not justified in holding the bed-rock representations in the drawings were not warranties upon which plaintiff (contractor) could and did rely in entering into the contract."

Legal Editor: Yesterday we had a truck loader injured because the driver put up wrong stringers. Please quick give us the law quickly.—R. Q.

Answer: The answer is easy, but not

Underground Mining Demands Manganese Steel Buckets . . . . .

In tunneling and the removal of ore or rock, the equipment that handles the material receives incessant abuse — repeated impacts and severe abrasive wear.

A-517. 2 yd. Amsco all-manganese-steel welded type dipper on Lorain 82 shovel loading blasted limestone in underground quarry.

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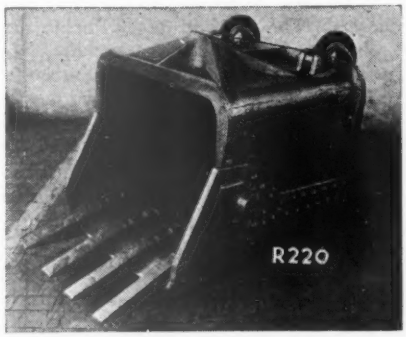

5/8 yd. Amsco Missabe type dipper with Vanderhoef front, used in a Newfoundland submarine iron ore mine.

Amsco dippers, buckets, scrapers and wearing parts have been made for every kind of mining and quarrying operation. You will find them on many rugged jobs where continuous pounding, heavy loads and abrasion would quickly destroy ordinary buckets. Amsco design has added substantially to the economy of the metal and the operating efficiency of this class of equipment. These designs make provision for the easy replacement of the parts which require it sooner or later. The use of manganese steel assures "a long time between replacements."

11380. One of a number of Amsco dippers on Conway mucking shovels which speeded work on the Delaware aqueduct.

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in your favor. See *Williams v. Field Transportation Company,* 166 Pac. (2d) 884, reported April, 1946. This court held that a truck loader does not assume such risks as the negligence of a truck driver in selecting improper stringers on which to lay pipes being loaded. Thus, a driver, because he is his employer's representative, can make the employer liable for injuries negligently caused to assistants.

Legal Editor: Starting in 1848, a fellow named White used a dam and kept it repaired until about 1916. He has not used it since. We intend to buy White's land on which the dam is situated. Can White give us right to use the dam?—H. C.

Answer: In *City of Harrodsburg v. Cunningham,* 184 S. W. (2d) 357, reported March, 1945, it was shown that from 1854 to 1926 a man named Williams had maintained a dam which formed a reservoir to provide power to operate a grist mill. The dam was continuously maintained until January, 1926, when Williams had it removed. At that time the grist mill was in a dilapidated condition and had not been operated for many years. The higher court held that disuse of the dam for 18 years automatically forfeited the right of Williams to make a valid contract granting the right to another to construct and maintain a dam. Thus, it seems that your contract with White would be void.

Legal Editor: We have a liability insurance policy. Our driver injured a pedestrian two weeks ago and today, when we notified the insurance comnay, we were told that the policy is void because we did not at once notify the insurance company. Is he right?—P. S. & G. C.

Answer: A requirement in "liability" insurance policies on automobiles is that the automobile owner must give the insurance company written notice immediately after the occurrence of an accident. Failure of an automobile owner to comply with this clause renders the policy void.

For example, in *Jackson v. State,* 23 So. (2d) 765, reported February, 1946, it was shown that a motor-truck owner held a liability-insurance policy which contained a clause that required him to notify the insurance company of the occurrence of an accident "as soon as practicable". The truck driver ran into and killed a child. The truck owner delayed 82 days after the occurrence of the accident before notifying the insurance company. The higher court held that this delay invalidated the insurance policy.

On the other hand, see *Jones v. American Mutual Liability Insurance Company,* 185 So. 509, where the court held that a delay of 25 days in the giving of a notice of an accident was a substantial compliance with the provisions of an automobile liability policy requiring notice "as soon as practicable". In this case the testimony showed that the insured did not know until several days after the accident that the injured person intended to sue for damages.

Legal Editor: About one year ago a gas pipe in our basement leaked gas and an explosion of gas occurred causing considerable damage to our stock of merchandise. Please cite decisions which may assist our lawyer to win this suit.—R. M.

Answer: Generally speaking, a gas company is liable in damages for injuries to persons and property caused by escaping gas *only* if the testimony proves that the gas escaped through negligence or lack of ordinary care on the part of the company's employees, or if the gas company's employees failed to exercise ordinary care to discover and stop the leak after receiving notification that gas was escaping.

See *Alesandria,* 16 Ind. App. 534, where the testimony proved that gas company employees had knowledge of imperfect condition of a gas pipe. The higher court held that it was not necessary for the person, who was injured in an explosion, to prove that the company officials knew that gas was escaping. This court held that knowledge of company officials of the dangerous condition of the pipe was sufficient to obligate the gas company. Also, see *Dow v. Winnipesaukee Gas Company,* 69 N. H. 312; and 42 L.R.A. 569, to the same legal effect.

Therefore, it is my opinion that you are entitled to recover damages if you prove that the company employees had knowledge of the defective pipe. If the pipe was within the control of, or owned by, the gas company, you may recover damages because the gas company is required to use a high degree of care to inspect such pipes frequently and make necessary repairs.

Legal Editor: Can you tell me now whether a broker can charge a commission and make our price above the O.P.A. ceiling?—W. C.

Answer: Before enaction of the Clayton Act, a broker could legally accept payments from both a buyer and a seller. However, under the present laws it is illegal for a broker to accept commissions from both.

For example, in *Modern Marketing Service, Inc. v. Federal Trade Commission,* 149 Fed. (2d) 970, it was shown that a firm is engaged in business of manufacturing, packing, and selling groceries under various brands. The Federal Trade Commission alleged that a broker had violated the Clayton Act by accepting fees from the sellers in addition to commissions received from the purchasers. The higher court held that brokerage commissions cannot be paid by a seller to an agent for the buyer for services which are incidental to the broker's main activities on behalf of buyers, even though the services are genuine and of great benefit to the sellers.

Legal Editor: The question has arisen whether our night watchmen are interstate employees and whether we must pay them wages under the Fair Labor Standards Act. We do business for the U. S. Government, and want to know whether this fact may exempt us from this Federal wage law.—A. G. C.

Answer: The fact that you perform services for the government does not exempt your employees from the Fair Labor Standards Act, or other Federal laws, if they are "interstate" employees. With respect to night watchmen, see *Couch v. Arkansas,* 168 S. W. (2d) 822. Here it was shown that a night watchman filed suit under the Fair Labor Standards Act for back wages, penalty, and attorney's fees. The testimony proved that while working as the night engineer, he also operated the machinery and assisted in loading trucks. However, the higher court refused to hold the employer liable, because less than 1.3 per cent. of the total output of the plant was sold in interstate commerce.

Also, in *Southern Corporation v. Walton,* 11 So. (2d) 912, the watchman performed no service other than making an hourly tour of the plant. The court held that he was not engaged in "production of goods for commerce" and therefore was not subject to the Fair Labor Standards Act.

However, other higher courts have held that if a night watchman keeps up fires, assists in loading trucks or performs any other similar acts in addition to his "watching" a plant used in production, handling or processing materials sold in interstate commerce, such watchman is an "interstate" employee. See *Doyle v. Johnson Brothers,* 28 N.Y.S. (2d) 452.

Legal Editor, PIT AND QUARRY: Suppose a county sells a sand and gravel pit for taxes; does this sale take in the equipment, or not?—A. G. Co.

Answer: A sale of real estate for delinquent taxes is prior to all mortgages on the real estate. Also, the tax sale includes mortgages on the chattels, as equipment.

For example, in *Moeller v. Washington County,* 44 Atl. (2d) 252, the testimony showed that a county acquired title to mortgaged real estate under a valid tax sale. The county officials sold the equipment and tools for $2,000, to a purchaser who removed them from the premises, when in fact their value was several thousand dollars.

The holder of the mortgage on both the real estate and the equipment filed a suit against the county and alleged that the sale of the equipment damaged him to the extent of several thousand dollars.

The higher court held the tax sale prior to the mortgage and refused to hold the county liable.

Legal Editor: Through an error we made a contract to transport several loads of materials for $150. The tariff is $325 to which common carriers are subject. Are we liable in any way for making this contract at the low rate, since we are a legal common carrier? —W. T. C.

Answer: Your solution is compel, by suit if necessary, the shipper to pay the tariff rate of $325. The contract for $150 is void and has no legal effect. You can sue and recover $325 irrespective of your contract agreeing to transport the goods for $150. In fact the law requires that you collect from the shipper the difference between the legal rate of $325 and the illegal rate of $150 for which you contracted to transport the materials.

TRAFFIC News Digest

CENTRAL FREIGHT ASSOCIATION DOCKET

Docket 81011 (amended) (1)—Limestone, agricultural, not ground or pulverized, unburnt, in open top cars in bulk only, carload minimum weight 90 per cent. of marked capacity of car, except when car is loaded to full cubical or visible capacity, actual weight will apply. Establish on, from Findlay, Ohio, to points in Indiana rates as shown in Exhibit A.

EXHIBIT A

(Rates in cents per ton of 2000 pounds)

To	Proposed
Indiana Points:	
Auburn, Auburn Junction, Waterloo, Butler	116
Benton, Bremen, Elkhart, Foraker, Goshen, New Paris, Wakarusa, Warsaw	138
Corunna, Kendallville, Wolcottville	121
Eddy, Howe, LaGrange, Ligonier, Millersburg, Topeka, Wawaka	127
South Bend, Walkerton	149
Westville	160

Docket 81012 (1)—Sand (except blast, core, engine, filter, fire or furnace, foundry, glass, grinding or polishing; loam, moulding or silica) and gravel, carload, in open-top cars, minimum weight 90 per cent. of marked capacity of car, except when car is loaded to full cubical or visible capacity, actual weight will apply. Establish on, from Irving, N. Y., to Irvineton, Pa., 99 cents net ton, subject to ExParte 148.

Docket 81020 (2)—Sand and gravel in straight or mixed carloads as described in Rule 15, Description A, IC RR Tariff 13321-I, minimum weight 90 per cent. of marked capacity of car, except when car is loaded to full cubical or visible capacity, actual weight applies. Establish on, from Riverton, Ind., to Southern Ry. stations in Indiana, rates as shown in Exhibit B.

EXHIBIT B

(DOCKET No. 81020)

(Rates in cents per net ton of 2000 pounds)

To Southern Ry. Stations	Proposed
Huntingburg, Dale, Stevenson, Chandler, Boonville, Ind.	121
Lincoln City, Lamar, Evanston, Christney, Rock Hill, DeGonia Tennyson, Gentryville, Ind.	127
Troy, Cannelton, Ind.	132

Docket 81025 (2)—Sand (except blast, core, engine, filter, fire or furnace, foundry, glass, grinding or polishing, loam, moulding or silica) and gravel, carload minimum weight 90 per cent. of marked capacity of car, except when car is loaded to full cubical or visible capacity, actual weight will apply. Establish on, from Pittsburgh, Pa., to Maple (Washington county), Pa., 77 cents net ton, subject to ExParte 148 and 162.

Docket 81031 (2)—Stone, crushed, in bulk, in open top cars, carload minimum weight 90 per cent. of marked capacity of car, except that when cars are loaded to full or visible capacity, actual weight

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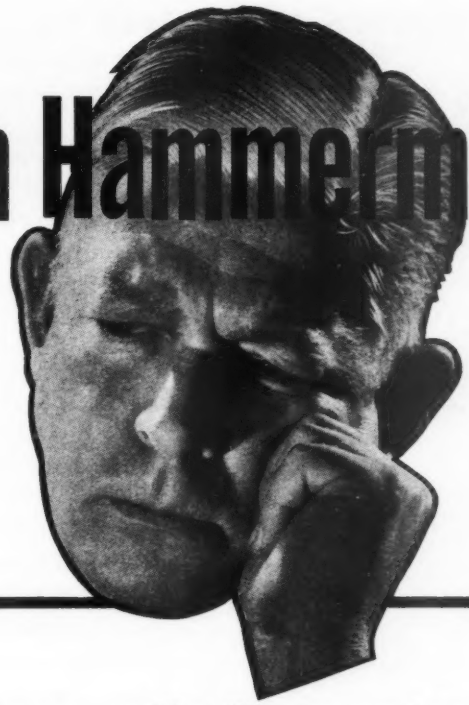

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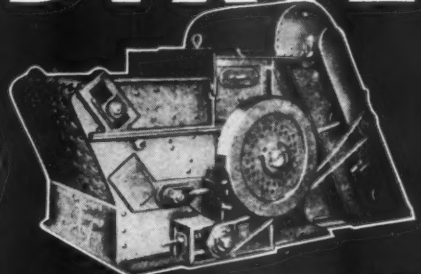

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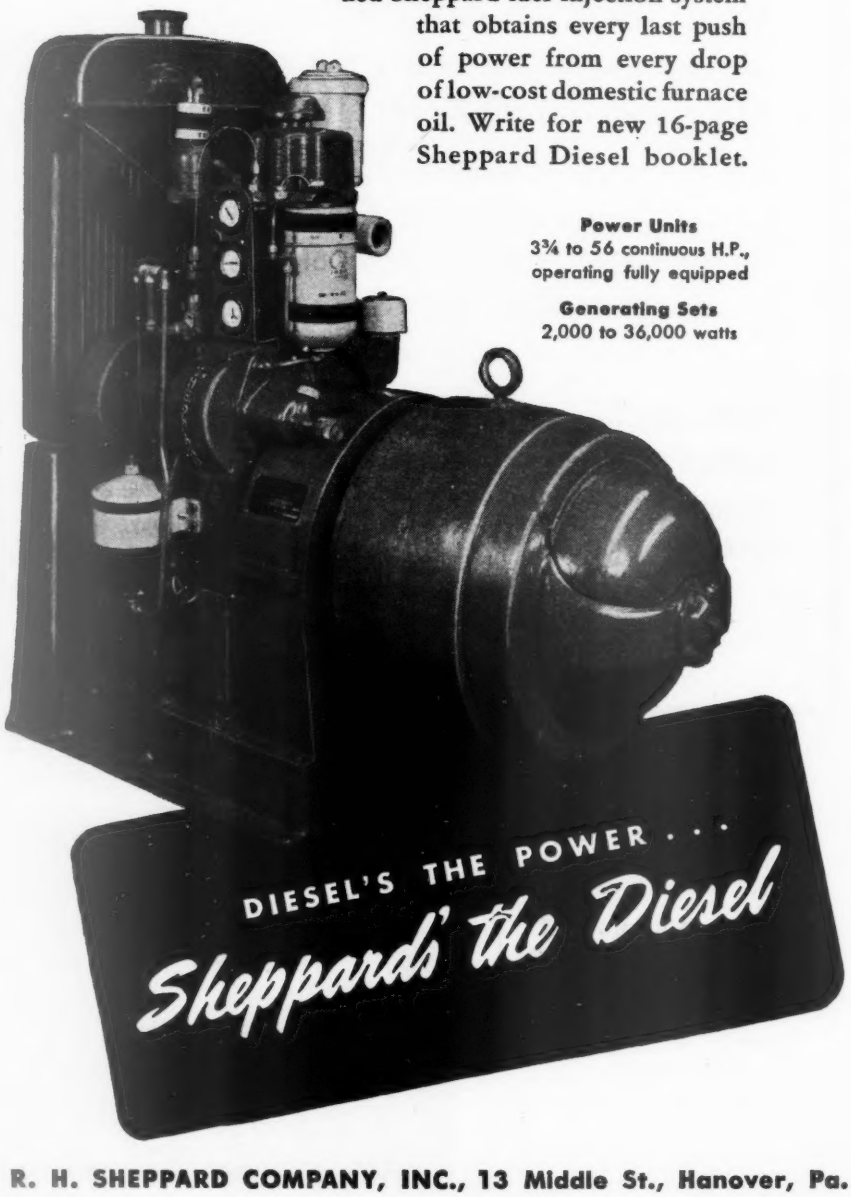
Generating Sets
2,000 to 36,000 watts



R. H. SHEPPARD COMPANY, INC., 13 Middle St., Hanover, Pa.

will apply. Establish on, from Millersville, O., to Jonesville, Mich., 118 cents; Quincy, Mich., 127 cents; Coldwater, Mich., 129 cents; Allen, Mich., 123 cents per net ton.

Docket 81036 (1) — Sand (other than blast, core, engine, filter, fire or furnace, foundry, glass, grinding or polishing, loam, moulding or silica) and gravel, in open top cars, carload minimum weight 90 per cent. of marked capacity of car, except when car is loaded to full cubical or visible capacity, actual weight will apply. Establish on, from Gosport, Ind., to Washington and Wheatland, Ind., 121 cents per net ton.

Docket 81044 (2)—(a) Limestone, ground or pulverized (unburnt), carload minimum weight 60,000 pounds; (b) limestone, agricultural (not ground or pulverized), unburnt, in bulk, loaded in open top cars only, minimum weight 90 per cent. of marked capacity of car except when loaded to full cubical or visible capacity, actual weight will apply. Establish on, from Piqua, O., to Three Oaks and New Buffalo, Mich., description (2) 215 cents and (b) 164 cents per net ton, subject to ExParte 148-162 increases.

Docket 81053 (2)—Sand, all kinds and gravel, in open top cars only, carload minimum weight 90 per cent. of marked capacity of car, except when car is loaded to full cubical or visible capacity, actual weight will apply. Establish on, from Havens, O., to St. Marys, O., 110 cents per net ton, subject to ExParte 148 and 162.

Docket 81057 (2)—Sand (except blast, core, engine, filter, fire or furnace, foundry, glass grinding or polishing, loam, moulding or silica) and gravel, carload, in open-top cars, minimum weight 90 per cent. of the marked capacity of car, except when car is loaded to full cubical or visible capacity, actual weight will apply. Establish on, from Irving, N. Y., to Andover, N. Y., 143 cents per net ton.

Docket 81034 (2)—Lime, common, hydrated, quick or slaked, carload minimum weight 30,000 pounds. Establish on, from Ludington, to Grand Rapids, Mich., 32 cents, subject to ExParte 148.

Docket 81049 (2)—Slag, a product of iron and steel blast or open hearth furnaces, carload minimum weight 90 per cent. of marked capacity of cars, except when car is loaded to full cubical or visible capacity, actual weight will apply. Establish on, from Detroit, Mich., to Merton, Wis., 270 cents per net ton, subject to ExParte 148-162 increase.

Docket 81041 (2)—Sand, all kinds and gravel, in open top cars, carload minimum weight 90 per cent. of the marked capacity of the car, except that when car is loaded to full visible or cubical capacity, actual weight will apply. Establish on, from Gravel Pit, O., to B. & O. Railroad stations, **viz.:** Dillon, O., 66 cents; Pleasant Valley, Nashport, O., 72 cents; Toboso, O., 77 cents; Clay Lick and Weiant, O., 83 cents per net ton. Subject to ExParte 148-162.

Docket 81001 (1) (a) — Stone, crushed, having value for construction purposes only and not suitable for agricultural or chemical purposes, in bulk in open top cars, carload minimum weight 90 per cent. of the marked capacity of the car

used; (b) limestone, ground or pulverized (unburnt); screenings, crushed stone, not ground or pulverized (unburnt); stone dust; unburnt, carload minimum weight 60,000 pounds. Establish on (a) 160 cents; (b) 204 cents per net ton, subject to ExParte 148-162.

Docket 81064 (2)—Stone, fluxing, furnace or foundry, melting or refractory (unburned), in bulk, carload minimum weight 90 per cent. of marked capacity of car furnished, except when loaded to full cubical or visible capacity actual weight will apply. Establish on, from Lewisburg, to Portsmouth, O., 123 cents per gross ton.

Docket 81078 (1)—Crushed stone, in open top cars, carload minimum weight 90 per cent. of marked capacity of car, except when cars are loaded to full cubical or visible capacity, actual weight will apply. Establish on, from Speed, to Salem, Ind., 94 cents per net ton subject to Ex Parte 148 increase.

Docket 81088 (2)—Stone, crushed, in bulk, in open top cars, carload minimum weight 90 per cent of marked capacity of car, except when car is loaded to full cubical or visible capacity, actual weight will apply. Establish on, from Georgia to Evansville, Tell City, Ind., 121 cents; Troy, Ind., 116 cents per net ton, subject to Ex Parte 148-162 increase.

ILLINOIS FREIGHT ASSOCIATION DOCKET

Docket IRC 511-478—Limestone, crushed, ground or pulverized, carload minimum weight 90 per cent. of marked capacity of car, except that when cars are loaded to full cubical or visible capacity actual weight will apply but not less than 60,000 from Prairie du Rocher, Ill., to Chicago, Ill.; Present—Combination. Proposed $2.05 per net ton, subject to Tariff-X-148 suspended.

Docket IRC 511-485—Agricultural limestone in open top cars, minimum weight 90 per cent. of the marked capacity of the car except that when car is loaded to full cubical or visible capacity actual weight will apply, from Rivermines, Mo., to various stations on I.C.R.R. shown below:

To	Present	Proposed
Clinton, Maroa, Grayville and Browns, Ill.	...	150
Decatur, Ill.	153	145
Pana, Ramsey, Ill.	153	140
Vandalia, Effingham, Ill.	139	135
Olney, Ill.	155	145
Newton, Ill.	149	445
Edgewood, Ill.	135	132

Subject to Ex Parte 148 increase.

SOUTHWESTERN FREIGHT BUREAU DOCKET

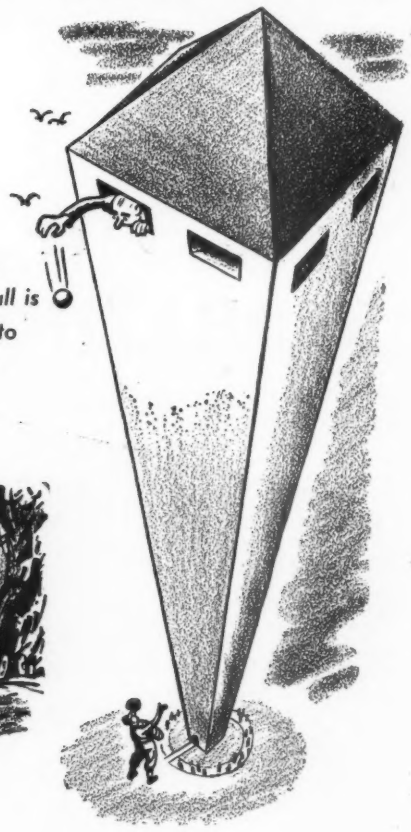
Docket 39628 (1)—Gypsum rock, Bucher, Okla., to Mason City, Iowa and LaSalle, Ill. To establish rates of 20 cents per 100 pounds to Mason City, Iowa, and 21 cents to LaSalle, Ill., on Gypsum Rock, mine run or crushed, minimum weight marked capacity of car, from Bucher, Okla., in C. R. I. & P. Freight Tariff 23950-N, ICC C-13099.

Docket 39720 (1)—Silica sand, Crystal City, Festus, Ludwig and Sand Pit, Mo., to Kansas City, Mo.-Kan., and Dodson, Mo. To establish rate of $1.60 per net ton on silica sand, carload, from Crystal, Festus, Ludwig and Sand Pit, Mo., to

Famous Stops

STOPPING A BASEBALL

dropped from the 555-foot Washington Monument is really a fast one! (The ball is hitting 185 ft. per second . . . is subject to tricky wind currents.) It was first done by a Big League catcher in 1908.



STOPPED AT EL ALAMEIN

in June, 1942, Rommel failed to breach the last fortification before Alexandria. By winning this battle, fought in heavy sandstorms, the British saved the vital Suez lifeline and prevented a giant Nazi pincers from meeting in the Middle East.

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at all times are Johns-Manville Industrial Friction materials. Available in a wide variety of flexible and rigid styles, these Friction Materials "Go to Work". . . on swings, crowds, hoists, and brakes . . . to give you the maximum cycles per minute on your equipment.

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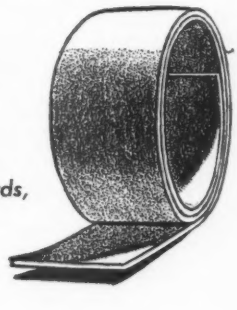

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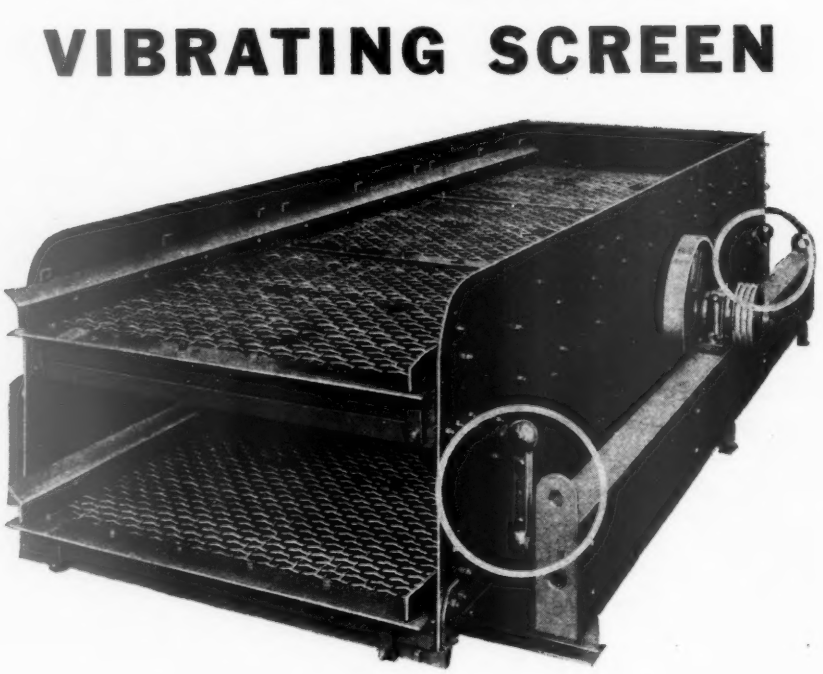
No Sir!

It's a SECO
VIBRATING SCREEN



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Operators screen more tons per hour day after day, year after year with Seco Vibrating Screens. That's because Seco's patented equalizer assembly sets up a true circular motion and keeps it under positive control at all times. Thus, no matter how the load is fed onto the screen, it won't bob, or weave or bog down—it keeps the load moving —improves grading and practically eliminates "blinding". Join the hundreds of operators using dependable Seco Vibrating Screens in all parts of the country. Start getting the "extra production" benefits of a Seco right away.

Write Dept. A for "A Guide to Better Screening".

SECO

Screen Equipment Company, Inc.
9 Lafayette Avenue, Buffalo 13, New York

Kansas City, Mo., and Dodson, Mo.

Docket 39801 (1)—Silica sand, points in Oklahoma to Shreveport, La. To establish rates of 215 cents per ton of 2,000 pounds from Ada, Okla., and 205 cents per ton of 2,000 pounds, from Denny, Hickory, Roff and Sulphur, Okla., to Shreveport, La. on silica sand in box cars or covered hopper cars.

Docket 39803 (1)—Silica sand, points in Oklahoma to Corning, N. Y. To establish rate of 583 cents per ton of 2,000 pounds from Ada, Hickory, Roff, Denny and Sulphur, Okla., to Corning, N. Y.

TRUNK LINE ASSOCIATION DOCKET

Docket 43688 (shippers)—Slag, unsuitable for further extraction of metals, carloads, minimum weight 90 per cent. of marked capacity of car, etc., from Sparrows Point, Md., to Bridgewater, Va., $1.87 per net ton, in lieu of current sixth class rate of 23 cents per 100 pounds. Reason: On same basis as rates applying from—and to—other points.

Docket 43697 (shippers)—Sand (except sand, moulding, bonded (naturally or otherwise), and except ground or pulverized sand), and gravel, in open top equipment, carloads, minimum weight 90 per cent. of marked capacity of car, etc., from McKeesport, Pa., to Plumville, Pa., $1.32 per net ton. (Rate will not apply on shipments in cars with tarpaulin or other protective covering.) Reason: Comparable with rates applying from and to other points.

Docket 43699 (shippers)—Sand, except sand, moulding, bonded, (naturally or otherwise), and except ground or pulverized sand and gravel, in closed equipment or in open top equipment with tarpaulin or other protective covering, also sand, moulding, bonded (naturally or otherwise), in all kinds of equipment, carloads, minimum weight 90 per cent. of marked capacity of car, etc., from Pinewald, N. J., to Whippany, N. J., $1.65 per net ton, in lieu of current class rate. Reason: On same basis as rates applying from and to other points.

Docket 43700 (shippers)—Stone, fluxing, furnace or foundry, melting or refractory, unburnt, in bulk, in open top cars, carloads, minimum weight 90 per cent. of marked capacity of car, etc., from Lebanon Valley District, viz.: Annville, Avon, Myerstown, Palmyra and Swatara, Pa., to Wyano, Pa., $1.70 per gross ton. Reason: Comparable with rates applying to other points in immediate vicinity.

TRUNK LINE ASSOCIATION DOCKET

Docket 43703 (shippers) — Limestone, crude, fluxing, foundry and furnace, when loaded in bulk, in open top equipment, carloads, minimum weight 90 per cent, of marked capacity of car, etc., from Inwood and Martinsburg, W. Va., to York Haven, Pa., $1.15 per ton. Reason: Comparable with rates applying to other points in immediate vicinity.

Docket 43708 (shippers) — Limestone, crude, fluxing, foundry or furnace, in open top equipment, carloads, minimum weight 90 per cent. of marked capacity of car, etc., from Martinsburg and Inwood, W. Va., to Waynesboro, Pa., 92 cents per gross ton, in lieu of current rate of $1.10 per gross ton. Reason: Compar-

able with rates applying to other points in immediate vicinity.

Docket 43702 (shippers)—Slag, Coke Oven, in bulk, in open top equipment, carloads, minimum weight 90 per cent. of marked capacity of car, etc., from Allison, Pa., $1.43 per net ton, in lieu of current class rate. Reason: On same basis as rates applying from and to other points.

Docket 43712 (shippers)—Crude gypsum rock, carload minimum weight 90 per cent. of marked capacity of car used, but not less than 80,000 pounds, from Edward, Ontario, to Allentown, Pa., Bath, Bath Jct., Brodhead, Coplay, Egypt, Hercules, Lesley, Martins Creek, Nazareth, Navarro, Penn Allen, Sandts Eddy, Pa., $4.80, Buffalo, N. Y., $2.55 and Portland Point, N. Y., $3.65 per net ton. Reason: Comparable with rates applying from and to other points.

Docket 43722 (carriers)—Lime, common, hydrated, quick or slaked, carload, from Chazy, N. Y., to:

Station	(*)	(†)	(‡)
Robinson, Me.	519	$6.16	$5.06
Presque Isle, Caribou, Washburn, Fort Fairfield, Me.	539	6.33	5.23
New Sweden, Van Buren, Fort Kent, Me.....	564	6.55	5.45
Smyrna Mills, Me.....	469	5.94	4.95
Ashland, Me.	509	6.16	5.06

*S. L. miles.
†Minimum 30,000 pounds per net ton.
‡Minimum 50,000 pounds per net ton.
In lieu of current sixth class rates. Reason: To place rates on the recognized basis.

WESTERN TRUNK LINE—NEW APPLICATIONS

Docket D-25-178—(a) Lime, common, viz: Lump, crushed, pulverized of hydrated, in straight or mixed carloads, minimum weight 30,000 pounds. (b) Mortar mix, calcined plaster, stucco and/or wall paper, in straight or in mixed carloads, minimum weight 40,000 pounds. From points in Western Trunk Line territory specified below, also points in Southern Missouri. To points in Minnesota, North Dakota and South Dakota on the Great Northern, Northern Pacific Ry. and M. St. P. & S. S. M. Ry., west of the line Duluth to Minneapolis, Minn., via Dresser Junction, Wis., and Withrow, Minn., including St. Croix, Falls, Wis. Present—Class or combination rates to apply. Proposed—To establish rates to points east of the arbitrary boundary in ICC Docket 23823, 203 ICC 429 by deduction of a differential of 3 cents per cwt. under the scale prescribed in that class and to points east of the arbitrary boundary described the deduction of 1 cent per cwt. to points on and west of the border of arbitrary territory resulting rates to be increased 10 per cent. to reflect the Ex Parte 123 adjustment.

Docket X-E-41-762 — Gravel, carload minimum weight same as Item 90, Western Trunk Line Tariff 237-G, P.S.C. Mo. No. 833. From Louisiana, Mo., to Moberly, Mo. Proposed—95 cents per ton of 2,000 pounds. Subject to Ex Parte 148 increase.

Docket E-41-763—Stone, rip rap, quarry or chips. From Dell Rapids, S. D., to Florence, Neb. Rates: Present—$1.01. Proposed—To cancel rate.

Docket E-41-764—Stone, ground or pulverized, crushed or rough quarried; also strippings of stone quarries, straight or mixed carload. From Vallmeyer and Prairie du Rocher, Ill., to St. Paul, Minn., and Minnesota Transfer, Minn. Proposed $3.00 per ton of 2,000 pounds.

Docket E-41-768—Silica sand, carload. From Ottawa, Ill., to Wichita, Kan. Proposed—$3.59 per ton of 2,000 pounds.

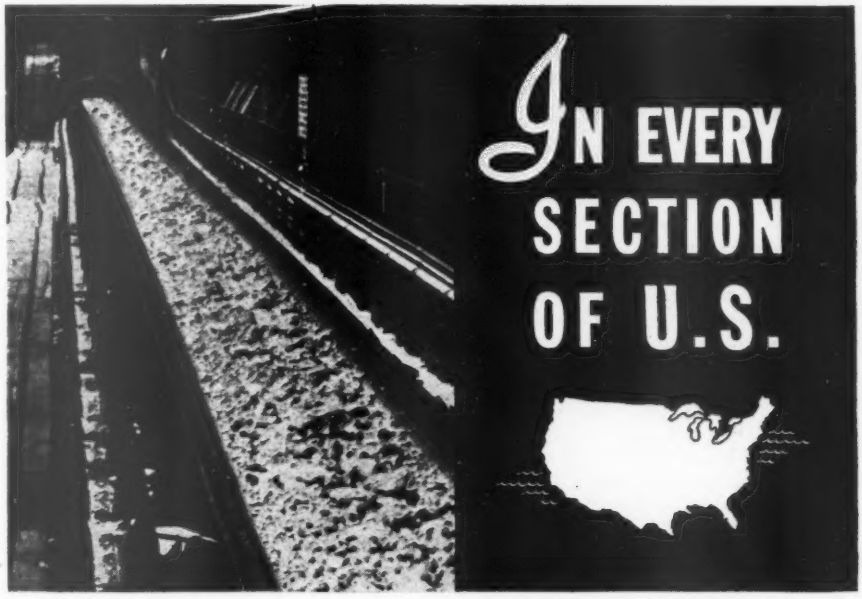
Docket X-E-43-207—Gypsum rock, mine run or crushed (not ground), carload from Rapid City, S. D., to Linwood, Ia. Proposed 21 cents per 100 pounds (subject to Ex Parte 148). Minimum weight marked capacity of car.

Docket E-41-763—Stone, rip rap, quarry scrap or chips. From Dell Rapids, S. D., to Florence, Neb. Rates: Present $1.01. Proposed—to cancel rate.

Docket X-D-11-118—Cement, carload, as described in Item 35, Western Trunk Line 133-J, minimum weight 50,000 pounds. From Laramie, Wyoming, to Oral, S. D. Proposed 26 cents. (Subject to Ex Parte 148.)

Docket E-41-760—Stone Crushed, carload minimum weight no change from Sioux Falls, S. D., to Montrose, S. D. Proposed—55 cents per ton of 2,000 pounds.

Docket E-41-767—Silica sand in box cars. Minimum weight marked capacity of car used but not less than 80,000 pounds. From Pacific, Mo., to Peoria, Ill. Proposed—To establish a rate of 249 cents per net ton, subject to expiration date of December 31, 1946, per Item 100, **St. L. & S. F. Tariff 162-I, routing via** St. L.-S. F., St. Louis, Mo., or E. St. Louis, Ill., IC or Ill. T., Springfield, Ill., C. & I. M. or via Wabash, Taylorville, Ill., C. & I. M. or via Ill. T. direct.



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NEW MACHINERY and SUPPLIES

● New Crusher

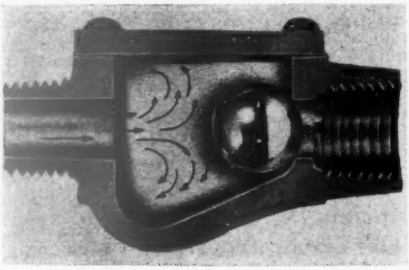
The Ebersol Crusher & Engineering Company, of Lancaster, Pa., announces the availability of the new "Model 940" two stage Ebersol crusher. The frame of this crusher is made from 2½-inch

Two-stage jaw crusher made from cast-steel.

plate and the frame spacers and two jaw heads are made from cast steel. The screen, which is wider than those used on earlier models, is mounted directly on the main rotating head which has a speed of 450 rpm. The manufacturer reports that this screen removes much of the finished product thus relieving congestion in the lower jaws and permitting close settings. The eccentrically driven jaw head operates the second jaw head by means of a radius rod located directly above the screen. The Model 940 takes up to 9-inch stones, and has a capacity of 40 tons per hour with the jaws set at ¾ inch; with this setting, 80 per cent. passes through a ¾-inch square screen. The crusher is driven by a 75-hp. motor.

● Safety Valve

The E. D. Bullard Company, of San Francisco, Calif., is introducing the "Numatic Safety Check," which is said to eliminate the dangers of wildly whipping compressed-air hoses. In the event



Valve automatically shuts off air lines.

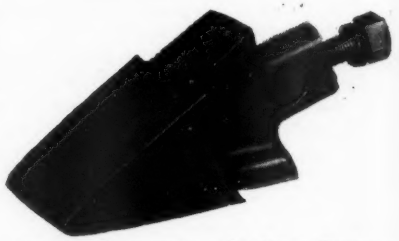
of excessive flow of air caused by accidental disconnecting or rupture in the air line, this valve will shut off the air immediately. It consists of a housing, with hexagonal shaped ends, and an internal steel ball. The housing has female threads in both ends for attachment between compressor and air line. The steel ball rests in the compressor end of a sump within the housing. This sump slopes toward the outlet port and excessive air flow through the valve causes the ball to roll up the slope, thereby sealing the port to the air line. A bleed hole allows a small amount of air to escape, equalizing the pressure between air line and pressure tank when the line is again made air-tight. The Numatic Safety Check is manufactured for working pressures up to 250 pounds, and comes in standard ½- and ¾-inch sizes.

● Lock Nut

A one-piece lock nut, known as "Ancor-lox," is now available through the An-Cor-Lox Division of the Laminated Shim Company, Glenbrook, Conn. The locking ring, a soft, non-springing metal device, is permanently inserted and forms an integral part of the nut. The tightening pressure forces this locking insert to

One-piece lock nut.

flow inward around the bolt threads, thus preventing axial play in the assembly. The manufacturer states that this nut will not damage the bolt, may be re-used many times, and is effective under all conditions of bolt stretch, wear, moisture, or temperature changes. Ancor-lox nuts can be made from all commercially available metals or combinations of metals to meet specific conditions of corrosion, heat, or strength.



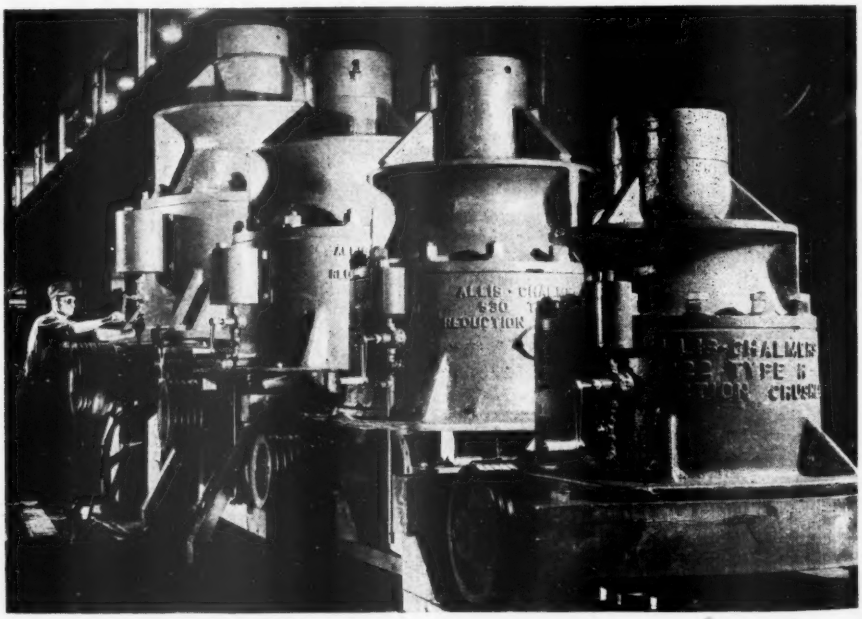
For dragline service, the Page Engineering Company of Chicago is introducing its new reversible center shank tooth point. The hook bolt fastening is designed so that the bolt will not wear or tear loose from the point. Page states that this tooth point will not come loose or work off if 25 per cent. minimum bearing is maintained, both on the stub ends and on the shank above and below the bolt head.

● Jaw Crushers

The Allis-Chalmers Manufacturing Co. of Milwaukee presents its new "A-1" jaw crusher, said to crush material in a straight line between the jaws without grinding or rubbing surfaces. The A-1 has an all-steel frame, either sectionalized or one-piece, suspended-type jaw plates, and renewable wearing plates behind the jaw plates, designed to eliminate wear on the jaws and frame.

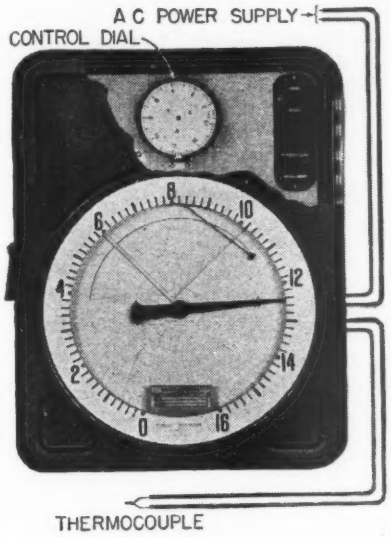
A reciprocating machine, the A-1 is equipped with balanced flywheels which are claimed to offset the reciprocating action and give minimum vibration. An adjustable crushing stroke is provided for by means of a shim arrangement. The non-choking chamber with full-width receiving opening reportedly gives increased capacity and a more acute crushing chamber that minimizes slippage. The A-1 is available in sizes up to 60 by 48 inches.

Jaw crushers available in 4 sizes.



● Electronic Pyrometer

A new electronic potentiometer-pyrometer has been announced by the Bailey Meter Company, of Cleveland, Ohio. This device records 1 or 2 temperatures on a uniformly graduated chart 12 inches in diameter, and also

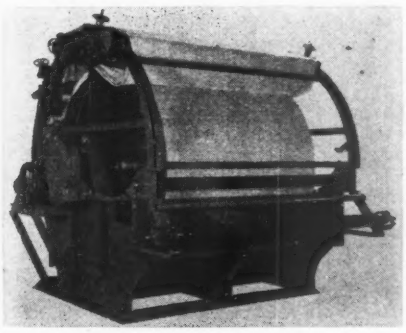


Makes instantaneous and permanent records.

gives instantaneous readings on a 29-inch scale which encircles the recording chart. Conventional thermocouples are used for temperatures up to 3,000 degrees F.; for temperatures above 3,000 degrees and for moving objects with temperatures above 1,500 degrees, radiation type thermocouples are used. Instead of a galvanometer or milli-volt meter, the Bailey pyrotron potentiometer circuit employs a d.-c. to a.-c. converter and an electronic detector to measure the potentiometer unbalance. Accuracy, stability, and permanence of calibration are credited to the use of the null balance principle.

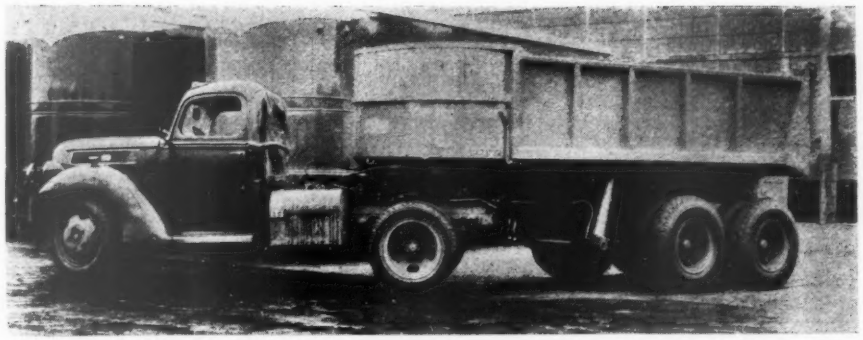
● Vacuum Filter

For continuous filtration operations, Filtration Engineers Inc., of Newark, N. J., present a line of "FE" rotary vacuum filters. These filters consist of a cloth covered drum, the periphery of which is divided into shallow compart-



All operations performed simultaneously.

ments that are connected to the common automatic valve controlling the vacuum to the individual compartments. As the drum rotates, filtering, dewatering, and discharging cake in sequence are con-



New dump trailer of 19-cubic-yard capacity, introduced by the Fruehauf Trailer Company, of Detroit, Michigan, is recommended for hauling sand, gravel, or other bulk material. Body dimensions are 18 feet by 7 feet, 5 inches by 47½ inches. Also available are models with 8 1/3 and 15½-cubic-yard capacity.

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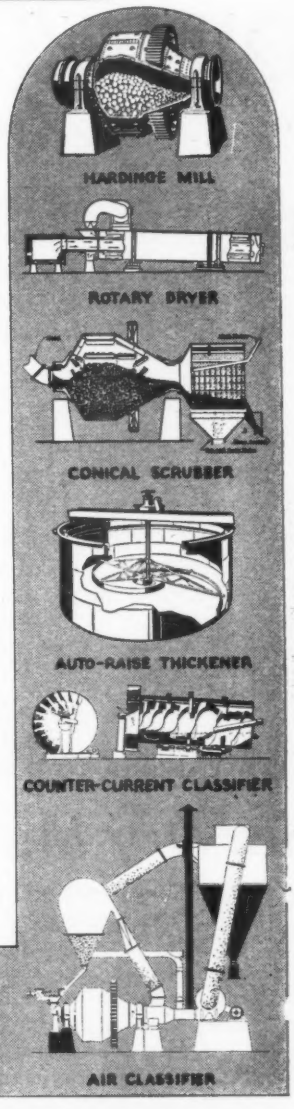

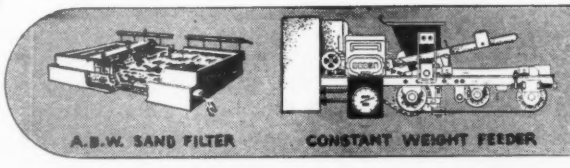

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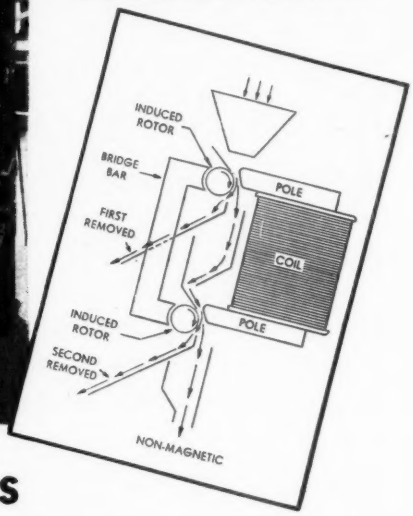
Below: Simplified diagram showing how revolving, magnetically-induced rolls take magnetic particles out of non-magnetic material.

Left: Dings 3-Roll "Super-High Intensity" Separator removing magnetic impurities from glass sand.



for Dry Materials

With Dings Induced Roll Magnetic Separators, you can remove finely divided iron and other feebly magnetic impurities from dry materials that would be impossible to take out with any other type of magnetic separator. Dings Induced Roll principle combines the force of gravity with "Super-High Intensity" magnetic strength to produce the most powerful type of separator known.

Dings Induced Roll Separators are built with two or more induced roll units, depending on fineness of separation desired. Full details are given in Dings Catalog 770—write for it today.

DINGS MAGNETIC SEPARATOR COMPANY
549 E. SMITH STREET MILWAUKEE 7, WISCONSIN

Dings
"HIGH INTENSITY"

"Separation Headquarters since 1899"

trolled by this valve; groups of compartments are performing these steps simultaneously. Cake discharge is effected by a string discharge mechanism which will handle cake thicknesses from ¼ to 12 inches. A compression mechanism for further reducing moisture content of cake and a washing process may be applied to these new filters. Drum diameters range from 3 to 10½ feet with filtering areas up to a maximum of 528 square feet. The design of these filters provides for the handling of many types of materials, including cement, lime hydrate, and bauxite sludge.

● Welded Dipper

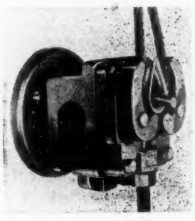
An all-manganese steel, welded type dipper has been recently introduced by the American Manganese Steel Division of the American Brake Shoe Company, Chicago Heights, Illinois. Austenitic

All-manganese steel, welded type dipper.

manganese steel is used in the construction of this new dipper to provide maximum resistance to fracture and wear. The parts are fitted together with round plugs, around which weld metal is deposited: the over-lapping, rabbeted joints leave a groove for the welded bead. The use of manganese steel, design, and welding are all claimed to make this dipper as strong and homogeneous as though made in one piece. A worn front can be removed and a new one rewelded in place without destroying the back. This Amsco welded dipper is made with capacities of ¾ cubic yards and up: sizes ¾ to 2 cubic yards are made in two body pieces, front and back; sizes over 2 cubic yards are made in four pieces, front, back and two side plates.

● Cable Vise

The Nunn Manufacturing Company of Evanston, Illinois, is now producing a



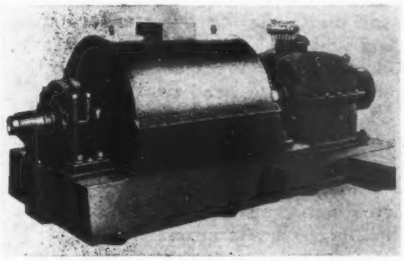
Holds cable in loop form.

new vise which forms a loop in wire rope when a nut is turned with an ordi-

nary wrench. "Cabl-Vise" automatically compensates for rope sizes within its designed range and is said to hold the loop firmly through splicing and clamping operations. This product is equipped with a swivel base that accommodates the vise in either a vertical or a horizontal position and rotates through 360 degrees, clamping in any desired direction. Cabl-Vise No. 1 takes rope sizes ¼- through ½-inch; Cabl-Vise No. 2, equipped with a hydraulic booster and accommodating sizes ⅝-inch through 1½-inch rope, is to be announced soon.

● Solid-Bowl Centrifuge

The Centrifuge Mechanical Equipment Company, Inc., of Hoboken, N. J., offers a new solid-bowl, continuous type centrifuge. Designed to handle fine slurries, sludges, mining concentrates, pigments, fine chemicals, clays, and nonmetallic

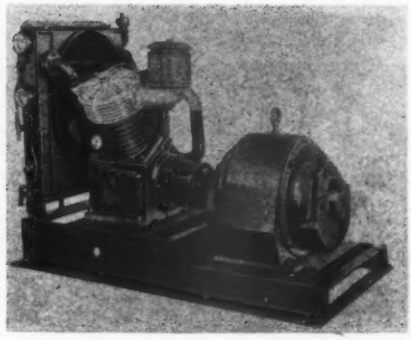


Solid-bowl, continuous type centrifuge.

minerals, this unit is also used for classifying and micron sizing. As the feed enters the bowl, it passes through a baffle and is discharged through ports in one end of the solid, conical-shaped bowl. The solids which form on the inside surface of the bowl are discharged continuously by the wiping action of a conical internal screw conveyor. Units are available with the following specifications: 24-inch to 36-inch bowl lengths, ½- to 6-ton-per-hour capacities, 10- to 25-hp. ratings, speeds from 400 to 1,000 r.p.m., and weights ranging from 8,000 to 18,000 pounds.

● Industrial Compressor

The Davey Compressor Company of Kent, Ohio, announces the production of a new line of industrial compressors in sizes from 60 to 315 cubic feet per minute. This equipment is designed especially for departmental systems of supplying compressed air. Advantages claimed by the manufacturer for this



Compressor for departmental system.

TRIPLE CHECK PRODUCTION

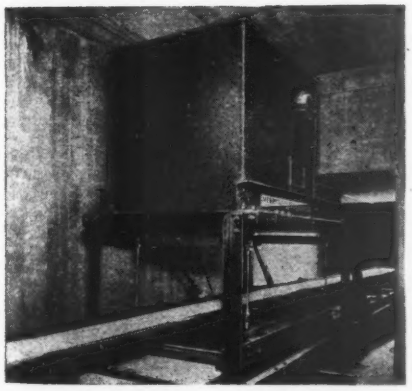
√ Automatically . . . . .

√ Accurately . . . . . .

√ Economically . . . . . .

with the MERRICK

WEIGHTOMETER



This is the modern, time-proven method of continuous weighing and recording of raw materials handled by belt conveyors. For precision and economy, specify MERRICK Weightometers in your production line. Write for Catalog.

MERRICK SCALE MFG. CO.
Passaic, New Jersey

PLACER MINING

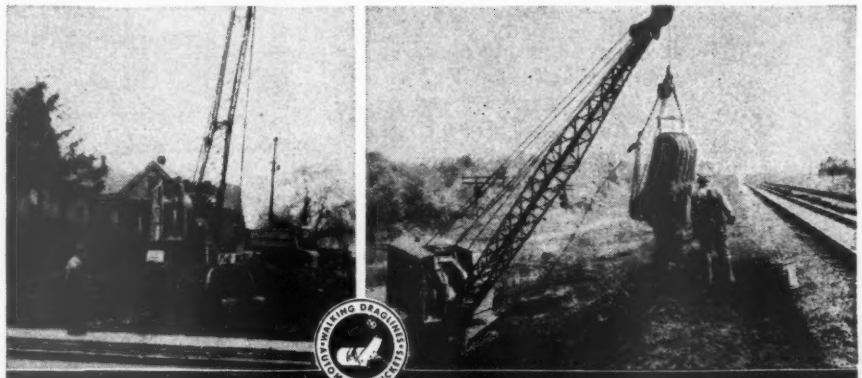
ABOVE: COAL STRIPPING

THE VERSATILE *AUTOMATIC* BUCKET

From coral reefs to excavating basements, the Page *Automatic* bucket has long met with success. Our capable engineers design every *Automatic* for the specific requirements of each job. From gold to sand, the *Automatic* will faithfully dig right in and come up with a full pay load in a minimum of time and effort.

BELOW: BASEMENT EXCAVATING

RAILROAD MAINTENANCE



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quickly laid
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immediate use
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give long service
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The Advanced All-Weather
Aid in Building Better Roads

system are: reduced pressure losses in "piping" air to the job; reduced power requirements; accurate pressure and air supply to the individual job; addition of another unit simplifies expansion problems; eliminates complete shutdowns due to central compressor failure; and reduced initial, operating, and repair costs.

● Synchronous Welder

A compact synchronous motor welder, utilizing the built-in separate exciter of the "Hobart Electric Drive Welder," is in production at the Hobart Brothers Company of Troy, Ohio. According to the manufacturer, this unit is so proportioned that it can be started across

Welder employs separate built-in exciter.

the line since it automatically synchronizes itself by the build up of the separate exciter and has approximately the same starting current as a conventional induction motor of equal horsepower. It is recommended that this unit be operated to draw leading current at no load, so as to compensate for other low power-factor loads. The leading power-factor characteristics of this unit make it a power-saving load.

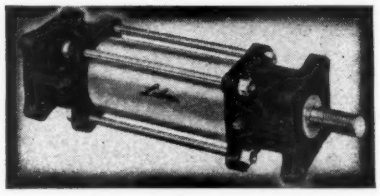
The motor is a "Hobart Revolving Field Synchronous Type" with squirrel cage windings. Once up to speed, the exciter builds up and automatically applies the correct excitation to the motor fields. By coupling the shaft to a gasoline or air electric motor, the synchronous motor can be used as an a.-c. generator for operating small tools, lathes, and grinders.

● Heavy-Duty Cylinder

The Engineering Products Company of Los Angeles has made available the "Ledeen Heavy-Duty Cylinder," which reportedly will operate by air, oil or water. The unit is made in one standard basic design having five standard diameters and stroke lengths. Each is available with four types of rod connections and six types of head mountings.

These cylinders are in service on jobs involving tilting and straightening dump trucks, steering tractor cranes and shovels, loading and unloading skip hoists, actuating stands in dust recovery and dumping concrete mixers.

Construction features claimed for the Ledeen cylinder include heavy hard-

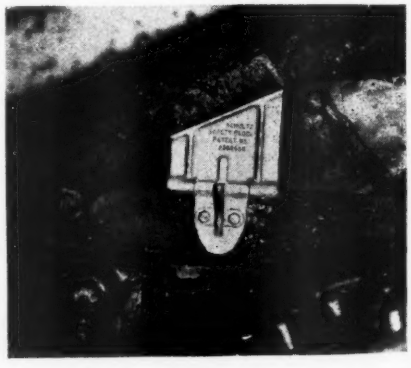


Multi-purpose cylinders.

drawn bronze tubing for the cylinder, all-steel piston with self-sealing cups, automatic cushion requiring no adjustment or regulation, ball check valve for quick starting or return stroke, and heavy tie rods.

● Dump Truck Safety

In an effort to eliminate the dangers and hazards which face men working under the upraised truck body of dump trucks, the B. F. McDonald Company of



Blocks upraised truck bodies.

Los Angeles, California, has developed the dump truck "Safety Block." These safety blocks, which are sold in pairs, are

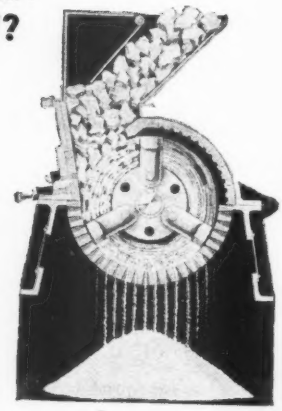
45,000,000 TONS of LIMESTONE

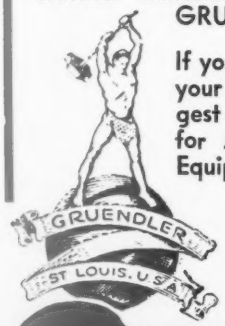
What part of this tonnage will your plant produce in 1947?

Gruendler Crushers are now producing over six million tons annually.

And NOW with the many orders in our plant for more Gruendler Crushers scheduled for Fall shipment, an additional million tons of crushed Limestone will be credited to GRUENDLER.

If you are thinking of increasing your production in 1947 we suggest you place your order Now for Additional Gruendler Equipment.





GRUENDLER CRUSHERS are known for their sturdy construction and dependability—For over 60 years your standard for comparison.

WRITE OR WIRE FOR DATA or BULLETINS

GRUENDLER

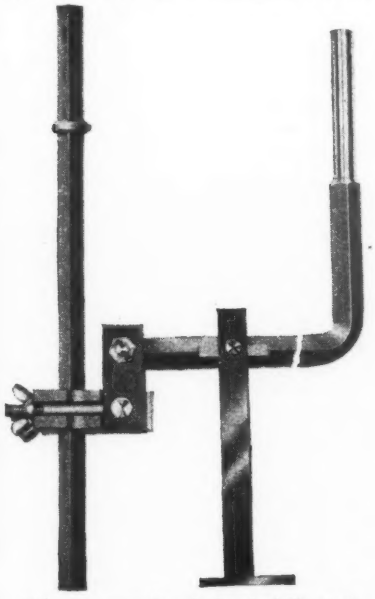
CRUSHER and PULVERIZER CO., ST. LOUIS 6, MO.

made of strong, rustproof copper-alloyed aluminum, and are fastened permanently to the dump bed of the truck, one block on each side. When the truck bed is raised, the blocks are flipped into position as shown in the photograph. Being permanently bolted in position, they cannot slip, and it is not necessary to lower the hoist or bed onto the safety blocks to assure an adequate grip. Safety Blocks are available in light- and heavy-duty models.

Largest truck tire ever built in the 48-year history of the Goodyear Tire & Rubber Company is inspected by J. E. Mayl, vice-president. The 27.00-33 tire, intended for earth-moving equipment, weighs 1,482 pounds and has an overall weight of 1,627 pounds, including rubber tube and flap. It has a load rating of 31,050 pounds at 40 pounds inflation pressure at 10 miles per hour, and a load rating of 27,600 pounds at 25 miles per hour with the same inflation pressure.

• Drill Steel Ejector

Another specialty item, produced by the Universal Pneumatic Tool Company of St. Louis, Mo., is "The Maloney Drill Steel Ejector." This ejector was designed to provide a quick and easy way



Aids in removing lodged drill steel.

to loosen a drill steel that has become stuck in a hole. To apply this device,

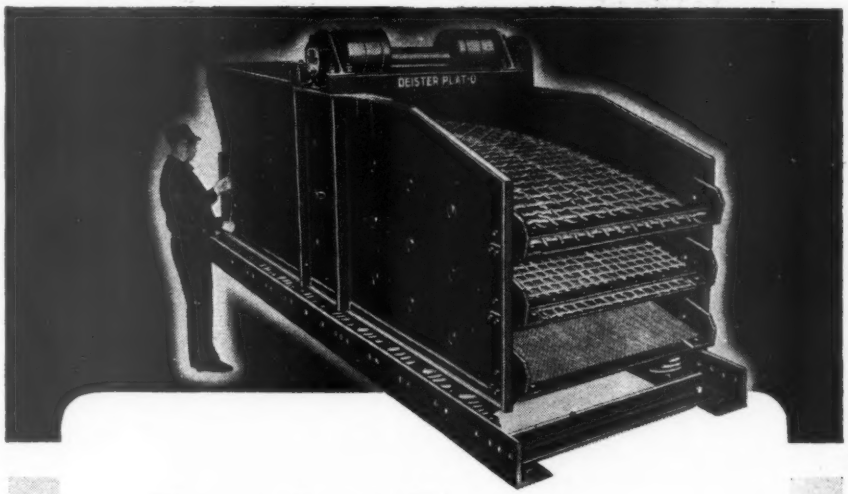
PULVERIZERS

Hundreds of Installations . . .
Use Bradley Pulverizers
for the reduction of
AGRICULTURAL LIMESTONE
Cement Materials and all
Dry, Non-Metallic Minerals

CAPACITIES: 1 TO 50 TONS PER HOUR
FINENESSES: 20 TO 350 MESH

BRADLEY PULVERIZER CO.

ALLENTOWN, PENNA.



• More Capacity
• Accurate Grading
• Longer Screen Cloth Life

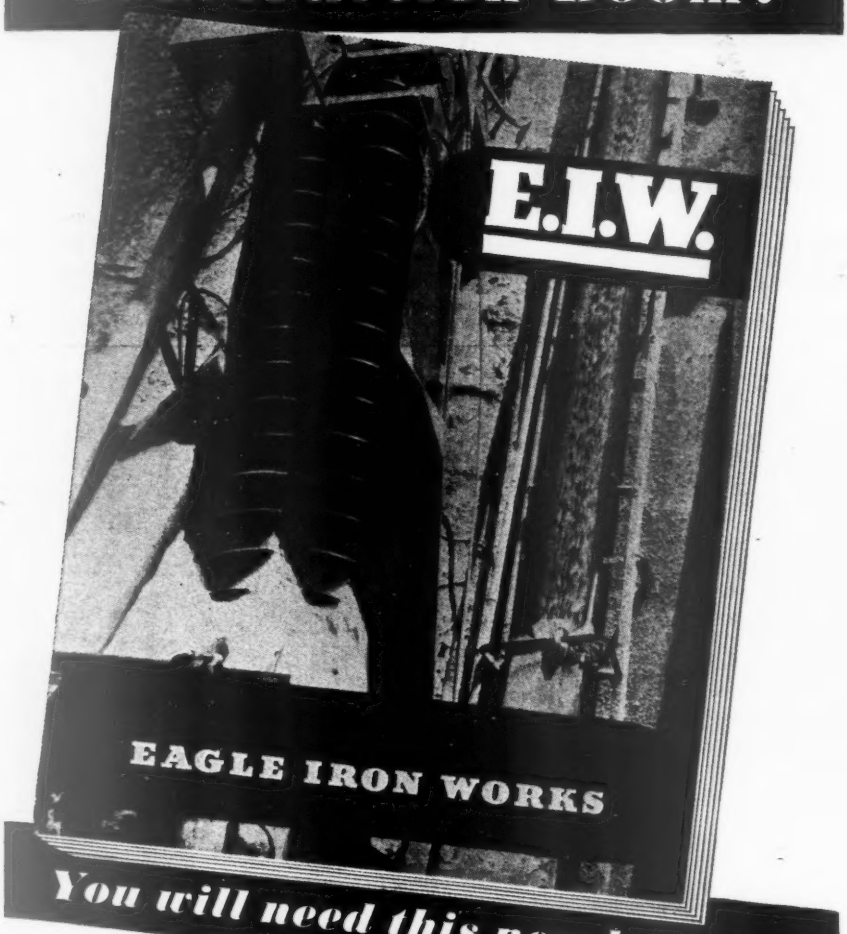
With a Plat-O Vibrating Screen you'll process *more* material, *more* accurately graded, at *less* cost because extreme "fines" pass through quickly . . . oversize bounces off rapidly . . . near sizes stay on the screen until maximum accuracy is obtained. The construction of the Plat-O Screen spring tension assembly prevents whipping and breakage of screen cloth.

Write the Deister Machine Company today for full details of the Plat-O Vibrating Screen.

DEISTER MACHINE COMPANY
Fort Wayne 4, Indiana

PLAT-O
by DEISTER

Are You Ready for the Construction Boom?



You will need this new book!

BULLETIN No. 46—just off the press — is more than a catalog of advanced washing and classifying equipment — it contains the answers to some of your most important sand and gravel production problems.

No matter what kind of material you are working, the Eagle lines contain the units that will give you maximum sand or gravel output at minimum ultimate cost.

For More Profitable Suction Dredging

Investigate the Eagle "Swintek" Dredging Ladder, which provides for deeper dredging, proper agitation of the deposit, exclusion of boulders and debris from the pipe line, and increased output of higher quality material. Ask for Catalog 745.

Pictured and described in this bulletin are the latest models of Eagle Log Washers, Screw Washers, Fine Material Washers, Dehydrators and Classifiers, Shale Removers, Sand Tanks, Special Equipment, Motor Mounts and Drives.

The features which have made Eagle sand and gravel washing and classifying equipment outstanding in performance, are presented in detail. Specifications are included, also an information sheet which will enable our engineers to make recommendations.

Write today for Bulletin 46.

EAGLE IRON WORKS
133 Holcomb Ave., Des Moines, Iowa

EAGLE *Specialized Sand and Gravel Equipment*
"SWINTEK" DREDGE LADDERS — SCREW WASHERS
LOG WASHERS — DEHYDRATORS — SAND TANKS
CLASSIFIERS — REVOLVING SCREENS

EAGLE IRON WORKS
DES MOINES, IOWA
"SERVING INDUSTRY FOR OVER SEVENTY YEARS"

the operator clamps it to the drill steel in such a position that the "fulcrum leg," which will be parallel to the drill steel, is touching the material in which the drill is lodged. The hammer is removed from the drill steel shank and placed on the round shank of the ejector. When the air is applied, the ejector serves as a lever with the hammer applying pressure at one end while the other end dislodges the drill steel.

● Dynamometer Indicator

W. C. Dillon Company, Inc., of Chicago, has introduced the "Dillon Tens-O-Trol," an electric remote tension and weight indicator, to be used with the Dillon dynamometer in measuring tension and weights. The device may be

Remote tension and weight indicator.

located as far as 300 feet from the dynamometer. It is protected by a heavy steel case and has a 9½-inch dial with 1-inch letters, for quick and accurate reading. The pressure beam of the Tens-O-Trol will give a full scale 360-degree reading with a .040-inch deflection of the beam. Readings are claimed to be within 1½ per cent. of the actual dynamometer measurement. Units are available with maximum capacities from 500 to 20,000 pounds.

● Portable Pulverizer

A new portable pulverizing unit for fast, large scale, economical agricultural limestone production has been announced by the Universal Engineering Corp. of Cedar Rapids, Iowa. It consists of feed hopper with a mechanical plate feeder, which feeds material uniformly to the two Universal pulverizers. These are mounted on the chassis beneath, one on each side of the hopper. Pulverizers of various sizes are available on this unit. These have V-belt drives and reversible manganese steel hammers and liners.

Crushed material is conveyed by channel frame under the conveyor. The rugged gooseneck chassis is built with dual tires and a rear-axle equalizer. The unit is furnished as a semi-trailer or as a full truck.

TRADE NOTES

S. E. McCrum

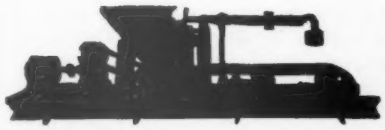
G. A. Sabin, director of advertising, The Colorado Fuel and Iron Corporation, has announced the appointment of Sidney E. McCrum as advertising manager of the Wickwire Spencer Division. Mr. McCrum was assistant advertising manager of the Wickwire Spencer Steel Company prior to the merger of that company with the Colorado Fuel and Iron Corporation.

Capt. C. McA. Evans

Captain C. McA. Evans recently returned from active duty in the Navy, has been elected president of the Chicago Steel Foundry Company. Mr. Evans entered the employ of the company upon his graduation from the United States Naval Academy in 1924, and served in various capacities, becoming vice-president prior to his re-entry into the service. During his tour of duty in the Navy, he served as gunnery and torpedo officer on a submarine tender which was stationed at Pearl Harbor on December 7, 1941. He advanced from the rank of Lieutenant Senior Grade to Captain while on active duty; his last assignment was Commanding Officer of an attack transport operating between the United States and Australia.

Joseph W. Sargent

Joseph W. Sargent, formerly manager of the Eastern Region of the Worthington Pump and Machinery Corporation's Construction Equipment Division, has accepted the position of manager of Construction Equipment Sales for the American Air Compressor Corporation of North Bergen, N. J. Mr. Sargent, who has been in the construction equipment business for the past 25 years, will promote the sale and rental of the Worthington-Ransome Blue Brute Line of portable air compressors, air tools, road pavers and mixers for the New Jersey firm.



SCHAFFER POIDOMETERS

for...

★ FEEDING

★ WEIGHING

★ BLENDING

★ RECORDING

PROPORTION WITH POIDOMETER

Over 1000 of these automatic, high-speed, precision machines are now in use feeding and proportioning raw and finished materials.

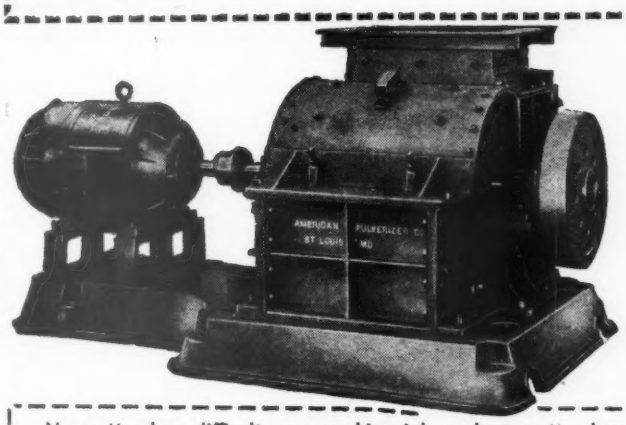
They are finely engineered and durably constructed for continuous, low-cost operation and will insure accuracy in weighing, conveying, feeding and recording.

Available with remote control recording and operating devices, and total weight recorders.

Write for Catalog No. 5

Schaffer Poidometer Co.
2828 Smallman St.
Pittsburgh 22, Pa.

For a FLEXIBLE CRUSHING OPERATION -AMERICAN HAMMERMILLS



AMERICAN *Swing Hammer* CRUSHER

No matter how difficult your crushing job, and no matter how varied your crushing problems, you'll find the wide range of reduction of American Crushers indispensable to a one-step or closed circuit operation. Quick, easy adaptability to changes in size runs from roadstone to agstone is a feature of American Crushers. Capacities up to 250 TPH.

Americans offer a wide range of reduction with high capacities,—custom-built to the requirements of your specific job.

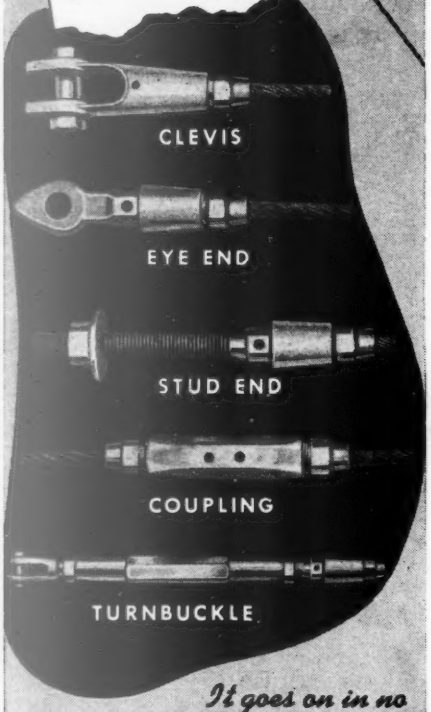
Send for bulletin on Rock Crushing Data.

American PULVERIZER COMPANY

Originators and Manufacturers of Ring Crushers and Pulverizers

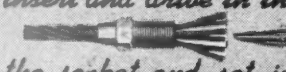
1059 MACKLIND AVE.
ST. LOUIS 10, MO.

Stronger THAN THE WIRE ROPE ITSELF . . . this Electroline-FIEGE CONNECTOR

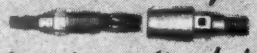


It goes on in no time — and hangs on for all time: this simple, husky device. Simply put the cable end through the sleeve, spread the strands,

insert and drive in the plug,



apply the socket and set in tight. Through



the ingenious inspection hole you can

see by the twisted strands that the joint is perfect.

These better connectors dampen vibration, prolong wire rope life. These advantages, plus low cost installation and life-time service, have made them the standby in the shipbuilding and construction industries, and wherever wire rope and cables are used. Available through your mill supply distributor.

MANUFACTURED SOLELY BY
Electroline Company
4121 SOUTH LA SALLE STREET
CHICAGO 9, ILLINOIS

The sale of the Thermoid rubber plant at Los Angeles by Thermoid of California, Inc., to Consolidated Products Company, Inc., of New York was announced recently. This plant, the former Grizzly Manufacturing Company, produced rubber belting, brake linings, hose and molded products under Thermoid ownership.

John W. Anderson, until recently assistant manager of the Birmingham, Alabama, office of Ceco Steel Products Corporation, has been appointed manager of the firm's Oklahoma City sales district. He succeeds R. K. Alexander, who has been placed in charge of Ceco's sales office and warehouse in Houston, Texas.

George Hajek, for 12 years sales engineer for Ceco Steel Products Corporation of Chicago, has been appointed manager of the Dallas, Texas, sales district. He replaces J. C. Boyce.

Edward G. Hoffman has been appointed technical engineer in the belting department of the U. S. Rubber Co. of New York. Mr. Hoffman was formerly on the staff of the Anaconda Copper Mining Co. engineering department.

The Hill Diesel Engine Co., Lansing, Mich., announces that, having completed a reconversion which encompassed a shift from 100 per cent. war production, it now has available a stock of Diesel engines for industrial purchasers.

In this accelerated program of engine manufacture, Hill has concentrated on its R line—vertical 4-cycle, solid-injection type industrial Diesels, with a horsepower range of 10 to 50 in two-, four- and six-cylinder models. Their kw. range is from 7½ to 30 at 1,500 r.p.m. on d.-c. current and 7½ to 25 at 1,200 r.p.m. on a.-c. current.

Austin C. Smith has been appointed manager of the W. W. Sly Manufacturing Co. of Cleveland for the New York district, comprising, in addition to New York, the northern part of New Jersey, northeastern Pennsylvania and the New England states.

John P. Howell, who was formerly a lieutenant in the U. S. Naval Reserve, has been named sales engineer with the Jeffrey Manufacturing Co. of Columbus, O., central Pennsylvania territory, with headquarters in Pittsburgh.

A. P. Hall has been elected vice-president of American Chain & Cable Co., Inc., of Bridgeport, Conn. Before joining the company in 1944, Mr. Hall had been in the steel industry for 22 years. He will continue his present duties as general manager of sales, and his headquarters will remain at 230 Park Avenue, New York City.

IT COSTS NO MORE TO USE THE BEST

REPLACE WITH "Indian Brand"

Shovel Dippers
Dipper Teeth
Shovel Treads

Crusher Jaw Plates
Mantles—Concaves
Bowl Liners
Roll Shells

Pulverizer Hammers
Grate Bars—Breaker Plates

Ball Mill Liners
Screen Plates

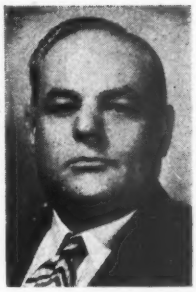
The Frog, Switch & Mfg. Co. CARLISLE, PA.
ESTABLISHED 1881

FARREL BACON CRUSHERS

Complete plants designed and equipped, including Screens, Elevators and Conveyors. Machinery for Mines and Rock Quarries, Sand and Gravel Plants. Engineering Service.

FARREL-BACON
ANSONIA, CONNECTICUT

The appointment of C. W. Hagenbuch as assistant vice-president of the Sheffield Steel Corporation of Kansas City was recently announced by J. C. Shepherd, executive vice-president.



C. W. Hagenbuch

Mr. Hagenbuch has been associated with Sheffield for 26 years. In 1920 he came to the company, then known as the Kansas City Bolt & Nut Company, as plant efficiency engineer. Under his direction will be development and merchandising of new products, including a number of special items.

W. K. Perkins, former assistant manager of sales for the International Harvester Company's Motor Truck Division, has been appointed sales manager, according to an announcement made by W. C. Schumacher, general manager of the division.

Major C. Stewart Comeaux, secretary-treasurer of the Institute of Makers of Explosives, has announced the removal of headquarters from 103 Park Avenue to 343 Lexington Avenue, New York City. The Institute has 12 member companies and three associate members, manufacturers of commercial explosives, blasting caps and fuse.

E. T. Rainey. has been named manager of manufacturers sales for the Goodyear Tire & Rubber Company's Western Division at Los Angeles. He was formerly district manager of the company's Aviation Products Division in Seattle, Wash.

Mr. Rainey will be assisted by R. E. Bolton in the off-the-road, farm implement and agricultural machinery fields in that area, while William van Amerongen, located at Seattle, will contact the automotive manufacturers in the Pacific Northwest.

F. H. Ludington, president of the Chase Bag Co. of Chicago, has announced the sale of the firm's factory building at 700 Washington Ave., North, Minneapolis, and plans for the erection of a new plant in that city. The factory was sold to the Gamble-Skogmo Co. The new building will contain approximately 160,000 square feet of floor space.

At the organization meeting of the newly-formed Industrial Diamond Association of America in New York, Frank E. Koebel, president of J. K. Smit & Sons, Inc., of New York, was named a director.

George S. Brust, who at his retirement in 1944 was manager of the asphalt department of the Shell Oil Co. at Boston, died on April 28 at Essex Junction, Vt., at the age of 62.

Control Your Product

with the

GILSON MECHANICAL TESTING SCREEN

Prepare for post war competition with this modern testing equipment. Operation is smooth and quiet. Separates accurately up to one cubic foot of concrete aggregate in five minutes or less. An attachment is available for vibrating standard sand sieves. Write for complete information.

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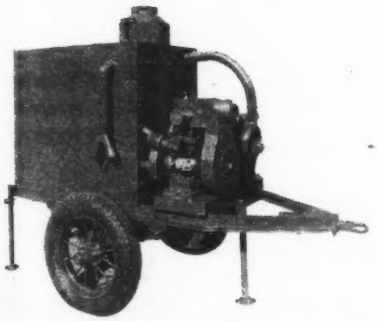

Use KADCO Dust Control equipment on your rock drills for greater drilling footage—less blacksmithing—longer tool life—better working conditions. Available in a wide range of sizes for all operations. For sale or lease.

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KADCO CORPORATION
LONG ISLAND CITY, N. Y.

Kiln End Burn-Outs KILL PROFITS

PYRASTEEL KILN ENDS

... prevent costly burn-outs and shutdowns that result in serious loss of production

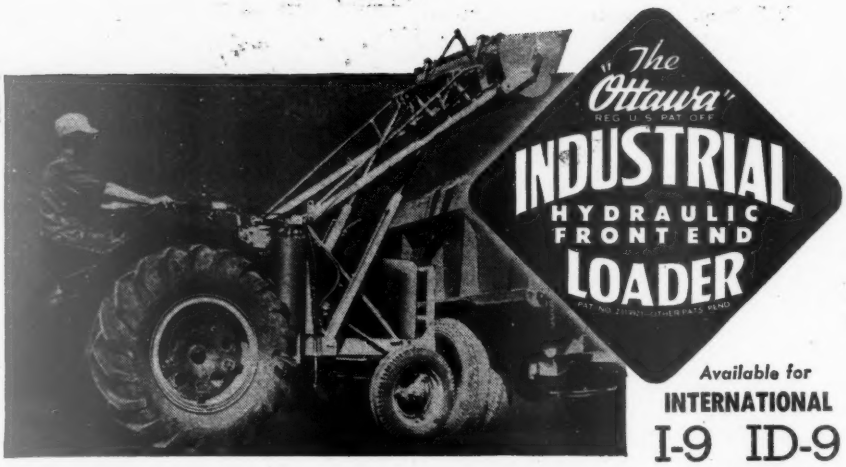
Install PYRASTEEL Segmental Kiln Ends at *both* the discharge and feed ends of your cement kilns, and be assured of long, dependable, and economical service.

Write for Bulletin of This Heat-Resisting Alloy

Showing discharge end of cement kiln fitted with PYRASTEEL Segmental Kiln Ends.

Unit Segments are easy to Install or replace.

CHICAGO STEEL FOUNDRY COMPANY
PYRASTEEL for high temperatures
KEDZIE AVE & 37TH ST.
CHICAGO 32, ILL.
Makers of Alloy Steel for 30 Years
EVANSTEEL for strength



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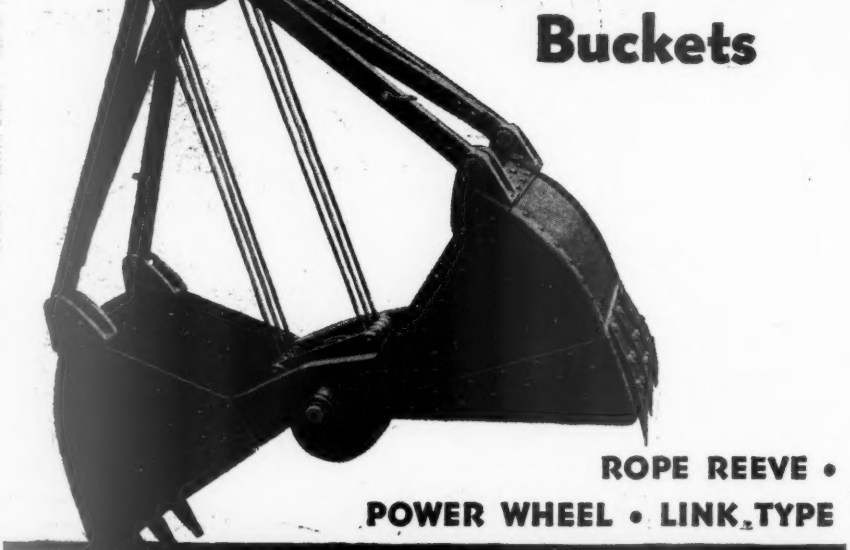
Lifts 4,000 Pound Load 9½ Feet

The "Ottawa" INDUSTRIAL Hydraulic Front-End LOADER is a HEAVY DUTY Machine . . . it lifts 4000 pounds of Sand, Gravel, Rock, Coal, Steel Pipe, Dirt or Other Bulk Materials to a height of 9½ feet quickly and easily . . . it assures operator perfectly CLEAR VISION at all times, is quickly and simply ATTACHED or DETACHED and is SHIPPED COMPLETE (there's absolutely nothing additional to buy or add) with complete HYDRAULIC SYSTEM including pump and valve. Bulldozer blade. Snowplow and Boom attachments are available. Write or wire today for FREE ILLUSTRATED FOLDER and prices. Immediate shipment.

Ottawa STEEL PRODUCTS, Inc.
OTTAWA P2, KANSAS



Brownhoist Buckets

ROPE REEVE •
POWER WHEEL • LINK-TYPE

Handling ore, gravel, coal or dirt Brownhoist Buckets do a better job because: 1) Larger sheaves reduce rope wear, 2) Heavy carbon-steel digging lips take deep clean bites, 3) Extra-sturdy construction insures long-life. Write to Industrial Brownhoist Corporation, Bay City, Michigan. Offices in New York, Philadelphia, Pittsburgh, Cleveland and Chicago.

Important changes in management personnel were recently announced by the International Harvester Co. Judson F. Stone has resigned as chairman of the board of directors but will continue to serve as a director and as a member of the executive committee of the Board.

John L. McCaffrey, who was until his promotion first vice-president, was appointed to succeed Fowler McCormick as president. Mr. McCormick was elected chairman of the board. Under the new setup, this officer is now the chief executive officer of the company. Mr. McCaffrey, as president, is the chief operating officer.

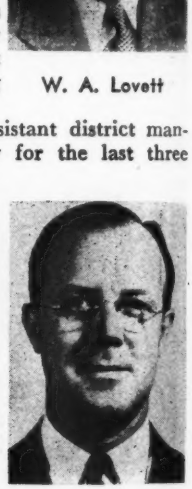
Sidney G. McAllister, formerly chairman of the executive committee (an office to be discontinued), continues to serve as a director and as a member of the executive committee.

W. A. Lovett

Three important personnel changes in the South-Central Sales Division of the Goodyear Tire & Rubber Company have been announced. W. A. Lovett, formerly district manager at San Antonio, Texas, has been named New Orleans district manager, succeeding R. J. Thoman.

L. W. C. Dye, assistant district manager at Kansas City for the last three and a half years, has been promoted to manager of the San Antonio district. O. S. Whitaker will succeed Mr. Dye at Kansas City.

L. W. C. Dye



O. S. Whitaker

The Allied Steel Products, Inc., of Cleveland has announced the following factory agents: H. J. Detwiler, Denver, for Colorado, New Mexico and northern and southeastern Wyoming; Bob Dawson, Auburn, Washington, for Montana; G. W. Roux, Vancouver, British Columbia, for Washington; L. R. Edminster, Portland, Oregon, for Oregon and Idaho; G. L. Henson, Salt Lake City, for Utah, eastern Nevada and southwestern Wyoming; the Kerr Equipment Company, San Francisco, for northern California and Nevada (excluding southeastern part); and the Burklyn Company, Los Angeles, for southern California, Arizona and southeastern Nevada.

Trade Literature

The pieces of literature listed below can be obtained direct from the manufacturers named, or requests can be addressed to Pit and Quarry's "Service to Readers" Department.

BUILDERS FLO-GAGE, MODEL FGG. Bulletin 360. Builders-Providence, Inc., Division of Builders Iron Foundry, Providence 1, R. I.

THERMIT WELDING FOR FABRICATION AND REPAIR; MUREX COATED BRONZE ELECTRODES; PRODUCTION OF STEEL CASTING WITH THERMICAST. Metal & Thermit Corp., New York, N. Y.

OSGOOD TYPE 100 SHOVEL CLAMSHELL DRAGLINE CRANE; OSGOOD MODEL 1000 SHOVEL DRAGLINE CLAMSHELL CRANE. The Osgood Co., Marion, O.

GARDNER-DENVER SINCE 1859—ENGINEERING FORESIGHT, MANUFACTURING PROGRESS. The Gardner-Denver Co., Quincy, Ill.

LIMA 1201 3½ CU. YDS. CAPACITY AIR CONTROL SHOVEL CRANE DRAGLINE. 20 pages. Bulletin No. 121B. Lima Locomotive Works, Inc., Lima, O.

HARDINGE BLM CLUTCH. Bulletin No. 45. Hardinge Co., Inc., York, Pa.

BUDA 161 SERIES DIESEL ENGINE. The Buda Co., Harvey, Ill.

SEVEN FACTS ABOUT LOW-COST PROTECTIVE PACKAGING. Bemis Bro. Bag Co., St. Louis, Mo.

MODEL F BOTTOM-DUMP EUCLID 13 CU. YDS. 8 pages. Form No. 201. The Euclid Road Machinery Co., Cleveland 17, O.

MODEL F REAR-DUMP EUCLID 15 TONS. 6 pages. Form No. 101. The Euclid Road Machinery Co., Cleveland 17, O.

LUBRICATION—A TECHNICAL PUBLICATION DEVOTED TO THE SELECTION AND USE OF LUBRICANTS. Jan., 1946, issue. The Texas Co., New York, N. Y.

AIR-CONTROLLED ORTON LOCOMOTIVE CRANES—DIESEL OR GASOLINE. Catalog No. 77. Orton Crane & Shovel Co., Chicago 5, Ill.

ROPEOLOGY. Issue 11, No. 46-11. 4 pages. The Macwhyte Co., Kenosha, Wis.

HAISS PORTABLE CONVEYORS. 24 pages. Catalog 1245. George Haiss Manufacturing Co., Inc., New York 51, N. Y.

LEADOLENE—PRODUCTS OF ENGINEERING AND RESEARCH ON THE DIFFICULT LUBRICATION JOBS OF INDUSTRY FOR MORE THAN 70 YEARS. The Brooks Oil Co., Cleveland, O.

MCLANAHAN BLACK DIAMOND CRUSHER. Catalog BD 457. McLanahan & Stone Corp., Hollidaysburg, Pa.

NEWCOMERS IN THE "CATERPILLAR" LINE—THE No. 8S AND No. 7S. STRAIGHT TYPE BULLDOZERS. Form 9198 Caterpillar Tractor Co., Peoria, Ill.

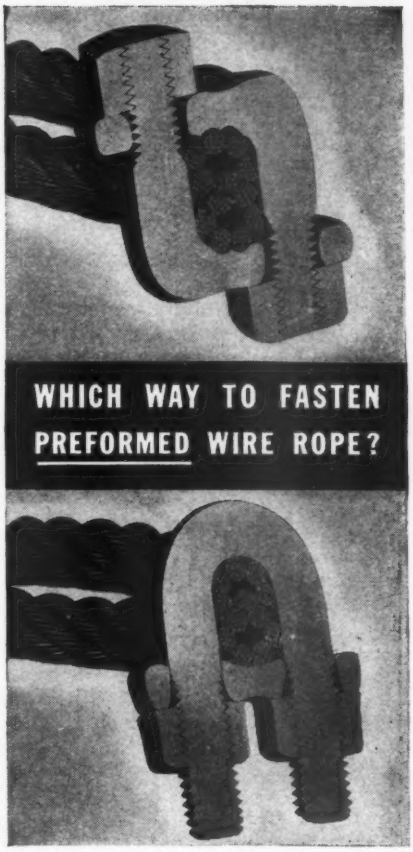
Illustrated above is the Models AEH to AHH series of 4-cycle single cylinder Wisconsin Air-Cooled Standard Engines, to which the following specifications apply:

MODEL	AEH	AFH	AGH	AHH
Bore	3"	3¼"	3½"	3⅝"
Stroke	3¼"	4"	4"	4"
Cu. in. Displ.	23	38.2	38.5	41.3
Hp. Range	4-6	5-7	6-8.5	7-9
Weight	130 lbs.	170 lbs.	175 lbs.	180 lbs.

If your equipment calls for an engine within the above power range, it will pay you to give serious consideration to the Wisconsin line . . . noted for rugged, heavy-duty serviceability and thorough-going dependability.

In addition to the engines listed above Wisconsin 4-cycle single cylinder engines are also available in 2 to 4 hp. sizes, and V-type 4-cylinder engines can be supplied in a power range of 13 to 30 hp. Detailed data furnished on request.

WISCONSIN MOTOR Corporation
MILWAUKEE 14, WISCONSIN
World's Largest Builders of Heavy Duty Air-Cooled Engines



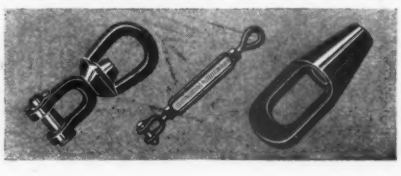
The cross-section views show what happens to wire rope. In Fig. 1, Laughlin's "Fist-Grip" Safety Clip holds the ⅝" rope with hardly any distortion (note hemp centers). In Fig. 2, hemp center under U shows how rope is squeezed and flattened by U-bolt's smaller bearing area and "Finger-Pinch". Both were tightened to same tension by torque-indicating wrench.

Here's Why "Fist-Grip" Clips Work Better

Laughlin Safety Clips have identical saddles, flat sides; hold rope firmly without crushing. Saddles fit snugly against "live" and "dead" ends. Fewer clips deliver full rope power. The only clips with drop-forged bolts. Test them, for your rope's sake.

Distributed through mill, mine and oil field supply houses. Write for catalog. Dept. 8, The Thomas Laughlin Co., Portland 6, Maine.

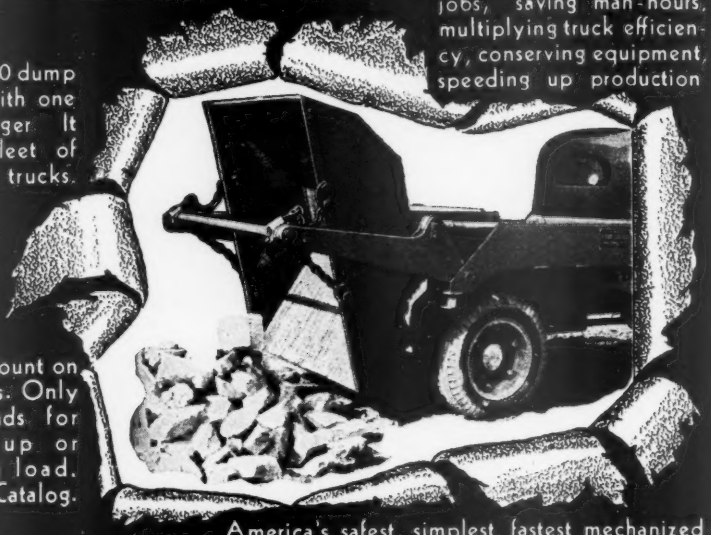
LAUGHLIN
THE MOST COMPLETE LINE OF DROP-FORGED WIRE ROPE AND CHAIN FITTINGS



Breaking into Today's News!

Brooks LOAD LUGGER is making sensational records on material moving jobs, saving man-hours, multiplying truck efficiency, conserving equipment, speeding up production

Use 5 to 10 dump buckets with one Load Lugger. It beats a fleet of ordinary trucks.



Easy to mount on any chassis. Only 15 seconds for picking up or dumping load. Ask for Catalog.

America's safest, simplest, fastest mechanized loading and dumping unit, for quarry, highway, industrial or construction work.

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For Long Haul Work!

Picture shows a 750-ft., span Sauerman Slackline Cableway equipped with a 2 cu. yd. bucket cutting into a deep deposit of gravel and moving the gravel to a screening plant at rate of 150 tons an hour.

SAUERMAN SCRAPERS and CABLEWAYS

Long Range Automatic Material Handling
With Simple One-Man Control

Ranging over a large area—loading, hauling and dumping in one operation—Sauerman Slackline Cableways and Power Scrapers are able to move sand and gravel from pit or bank direct to plant or handle stockpiles of any kind of material at the lowest possible cost. Built in many sizes for smallest or largest plants. Electric, gasoline or Diesel.

Operator has finger-tip control of the entire operation. Power demand is moderate. Repairs few and simple. Write for catalog and study evidence of what Sauerman machines are doing for others.

SAUERMAN BROS., INC.

534 South Clinton Street Chicago 7, Illinois

B. F. Goodrich Industrial Protective Clothing. Catalog Section 12000. The B. F. Goodrich Co., Akron, O.

Clevelands in the Modern Production Flow—Mixing and Grinding. Form No. 517. The Cleveland Worm & Gear Co., Cleveland 4, O.

What Are the Opportunities for College Men in the Diesel Engine Industry? The Diesel Engine Manufacturers Assn., One N. LaSalle St., Chicago 2, Ill.

Naylor Pipe. Catalog 44. Naylor Pipe Co., Chicago.

Mississippi Wagon. M-R-S Manufacturing Co., Jackson, Miss.

LeRoi New 105 Tractair. Bulletin T1. LeRoi Co., Milwaukee, Wis.

Scoopmobile Opens New Channels for Mechanized Materials Handling. Mixermobile Manufacturers, Portland, Ore.

Important Facts for the Man in Charge of Paper Bag Storage. Bemis Bro. Bag Co.

Bulletin No. 6885. Features Flexlastics, made from synthetic rubber-like compositions. Manhattan Rubber Division, Raybestos-Manhattan, Inc., Passaic, N. J.

Hobart Arc Welding Electrodes. Folder DM-710. The Hobart Brothers Co., Troy, O.

Hobart Accessories for Arc Welding. The Hobart Brothers Co., Troy, O.

What Good Is a War Record Now? 24 pages. Four-color booklet explaining development of new products and processes in the brake lining industry. Raybestos Division, Raybestos-Manhattan, Inc., Bridgeport, Conn.

Cedarapids Hammermill. Bulletin HM-1—15M-4-46. 4 pages. Iowa Manufacturing Company, Cedar Rapids, Iowa.

Bulletin No. 802. Descriptions of Hayward grapple devices for handling rock and other materials. The Hayward Co., New York.

Economy Pumps, Inc. Catalog No. B346. Economy Pumps, Inc., Hamilton, Ohio.

Mining By Block Caving. *By Philip B. Bucky, associate professor of mining, School of Mines, Columbia University, New York, New York.* 104 *pages.*

A series of articles reprinted from *The Explosive Engineer.* Each of the nine sections describes operations at a well-known mine. Among them are Asbestos Corporation, Ltd., Thetford Mines, Quebec; Johnson's Company, also at Thetford Mines; and the Riverside Cement Company, Crestmore, California. Detailed data, specifications, graphs, diagrams, sketches and photographs are included.

National Directory of Commodity Specifications. (*New revised edition*). *Published by the National Bureau of Standards, Washington, D.C. Price* $4.00.

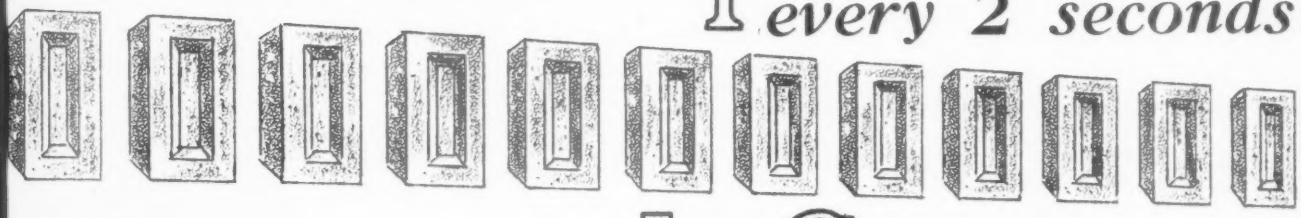
Lists by title, designating number and sponsoring organization the specifications and methods of test for all commodities regularly produced in the United States. Concentrated information on specifications and standards promulgated by national specification-making bodies.

September, 1946

The CONCRETE MANUFACTURER

A Special Section of ...

"THE BIG PARADE"... 1 PERFECT BRICK every 2 seconds



... from the new J&C SAND LIME and CONCRETE BRICK PRESSES

J&C Model NC Press. Capacity, 30 bricks per minute.

J&C Machines are "way out in front" for Producer-Popularity because they're sturdy, high-speed moulders that make accurately sized, finely textured, high strength brick.

J&C Presses feature automatic operation — adjustable, synchronized feed . . . mould depth regulator . . . uniform filling of mould pockets. They require no pallets. *And*, they make both facing and back-up brick.

Either the J&C Model NC Press, or the big Model A, with *double* the capacity, provide maximum service life, operating economy, and investment return.

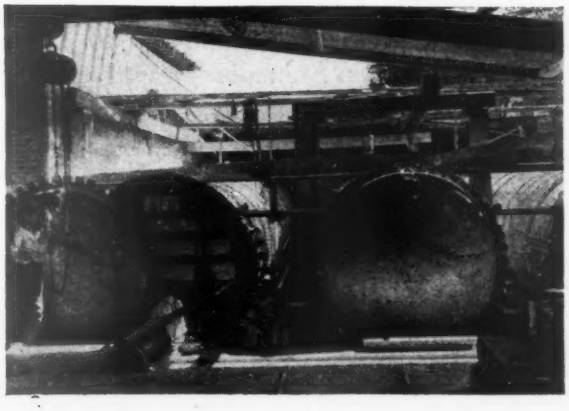
"WORK WELL DONE since '81"

HIGH PRESSURE STEAM CURING

This curing method produces high early strength concrete without using costly additives.

It shortens the curing period, giving comparable one year's strength in 24 hours. Deliver direct from kiln to job in one day.

J&C pressure-cured concrete is chemically stabilized—shrinkproof—crazeproof—crackproof—waterproof.



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Saginaw, Mich.

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Quick Facts About

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TRADE MARK REG. U.A.C. CO.

THE AIR-ENTRAINING PORTLAND CEMENT

That Makes Better Concrete at No Extra Cost

1. Complies with ASTM specifications: Provides the proper amount of entrained air by intergrinding with the cement the precise amount of air-entraining material needed for satisfactory field performance.

2. No extra cost: Sells at the same price as regular cement. Produces concrete that spreads, screeds and finishes more easily. Calls for no additional materials—merely the same care and good workmanship regularly employed.

3. Better concrete: Makes concrete more workable, more plastic, more cohesive and more uniform throughout.

4. More durable concrete: Requires less mixing water for a given slump; minimizes segregation and bleeding; tends to reduce manipulation scale; fortifies the concrete against freezing and thawing weather; renders paving concrete highly resistant to scaling action of de-icing salts.

5. Makes better concrete block: Reduces breakage, improves appearance, lowers water absorption and generally increases strength.

6. Called Duraplastic because it makes concrete more durable and more plastic.

Atlas Duraplastic air-entraining portland cement was originated and developed by Universal Atlas Cement Company. It is backed by eleven years of field and laboratory tests and research and proved by seven years of successful field performance. Duraplastic is specified by an increasing number of architects, engineers, contractors, dealers, ready-mix operators and concrete products makers. It is used for general concrete work—for paving, sidewalks, foundations, walls, gunite, slip-form work and concrete pipe and block.

Send for further information. Write to Universal Atlas Cement Company (United States Steel Corporation Subsidiary), Chrysler Building, New York 17, N. Y.

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A UNIVERSAL ATLAS PRODUCT

The CONCRETE MANUFACTURER

SEPTEMBER, 1946

Vol. 10 No. 3

A MAGAZINE DEVOTED TO PRODUCTION OF CONCRETE PRODUCTS AND READY-MIXED CONCRETE

ECA

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J. A. CONVERSE

Reduction Pending in Standard Specification for Width of Concrete Block

Pending approval by the manufacturers of concrete masonry units, the Underwriters' Laboratories, Inc., of Chicago, will revise the dimensions as specified in Paragraph 9, page 6 of the *Standard for Concrete Masonry Units* as follows: to reduce the width from "not less than 8 inches (nominal) as laid in the wall" to not less than 7⅝ inches (nominal). All face shell and web thicknesses to remain as given in the table on page 6 of the *Standard* and all other specifications to be unchanged.

Manufacturers desiring the Underwriters' certificate service on units of the reduced width dimensions are requested to notify the office. The *Standard* will be revised in accordance with the alteration.

Pipe Plant Conditions Reported by Peckworth

Howard F. Peckworth, managing director of the American Pipe Association, visited ten concrete pipe-manufacturing plants on a trip through the state of Washington a few weeks ago. He reported satisfactory conditions at the plants visited, many of which have their own aggregate pits. Mr. Peckworth also attended a special meeting of the Concrete Pipe & Products Association of Seattle.

New Products Plants Open In Midwest, South, West

New concrete products plants have been reported opening during the last month throughout all sections of the United States. Among the scores of newly-launched concerns were plants in Texas, Washington, California and Illinois.

At Atlanta, Texas, a new concrete block plant with a daily capacity of 2,000 units has been opened by Burr Logwood and John Caver.

A new industry in Prosser, Washington, is the concrete block and pipe plant of J. A. Hofmeister. A Flam vibrating block machine and a pipe machine manufactured by the Valley Iron Works of Yakima have been installed. Materials are to be shipped in by rail. The plant is to have a capacity of 3,000 units per shift and 800 linear feet of concrete pipe from 4 to 24 inches in diameter.

Utilizing Tionesta pumice stone from the hills near Tionesta, California, Marshall Hamilton will produce building blocks and bricks at his plant at Dorris, California, near Klamath Falls, Oregon. The plant is scheduled to be in operation by the middle of August.

Galesburg, Illinois, was chosen as the location of a new concrete block plant owned by John Mesick, a former member of the U. S. merchant marine, and Mrs. Mesick. The proprietors anticipate maintaining a production schedule of 2,000 units per day at their plant, which will be operated under the name of the Galesburg Cement Block Company.

New Hass Plant to Make 20,000 Units Per Day

Production hummed at the new concrete block plant of Hass Wholesale, Inc., between North Liberty and South Bend, Indiana, soon after its opening recently. Full-capacity production is expected to reach 20,000 units per day. In addition to concrete masonry, ready-mixed concrete also will be produced.

Two fully-automatic Besser Vibrapac machines make the blocks, which are removed from the presses and loaded on trucks by hydraulic lifts for curing. Frank Smiket, formerly associated with the Marquette Cement Manufacturing Company, who superintended the erection of the plant, is in charge of its operation.

$4,300 Gift of Friends Buys Veteran a Plant

John E. Johnson of Lakeland, Florida, a 19-year-old World War II veteran, regards the 13th day of the month as an important one. It was on June 13 of this year that he began operating his own business—a concrete block manufacturing plant.

Helpful fellow-citizens of Lakeland chipped in upon hearing of the young veteran's return to his home town with two artificial legs; and with the $4,300 contributed Johnson was able to launch his business venture.

Coming Events

October 7, 1946—Chicago. 34th National Safety Congress and exposition, Stevens Hotel.

October 16-19, 1946—Kansas City, Mo. Fall meeting, American Society of Civil Engineers.

March 5-7, 1947—Los Angeles. 17th annual convention, National Ready Mixed Concrete Association, Biltmore Hotel.

Concrete Products Figures For 2nd Quarter of 1945 Released by Census Bureau

The value of concrete masonry and other structural concrete products shipped during the second quarter of 1945 totaled $15,000,000, according to manufacturers' reports to the Bureau of the Census. This figure represents a considerable increase over that for the first quarter in 1945, which was $8,600,000.

There was a corresponding jump in the quantities shipped during the second quarter. For light-weight aggregate blocks, shipments rose 70 per cent., from 24,500,000 blocks in the first quarter to 41,600,000 in the second. Shipments of heavy-weight aggregate blocks increased from 28,000,000 units in the first quarter to 52,000,000 in the second, a gain of 85 per cent. Nearly all other concrete masonry products showed larger shipment figures for the second quarter.

During the second quarter production of both light- and heavy-weight blocks rose approximately 50 per cent., increasing from 25,000,000 to 37,000,000 blocks for light-weight and from 30,000,000 to 48,000,000 for heavy-weight units.

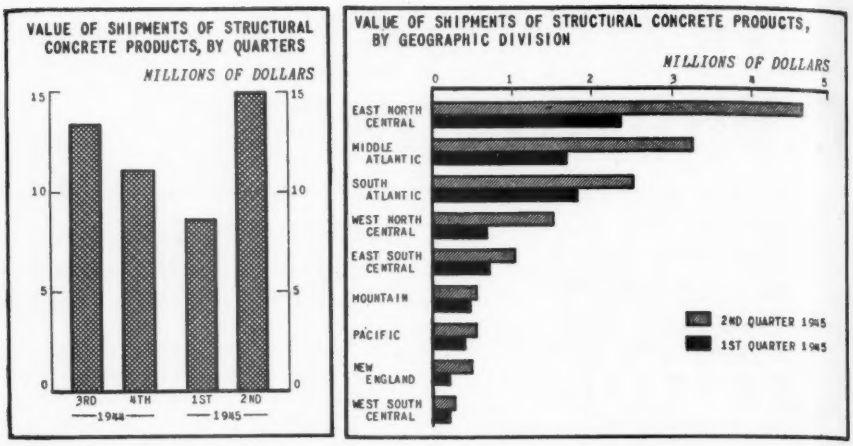
However, shipments of concrete blocks exceeded production during the second quarter to such an extent that stocks of both light- and heavy-weight blocks declined sharply. In terms of the second quarter shipment rate, inventories for both types of units represented less than a three weeks' supply. Stocks of secondary products remained stable.

Representatives Sent to U. S. By International Firm

Arthur Ryner and his son, Fred Ryner, of the International Corporation, of London, England, were recent visitors in this country. Their company is a consulting engineering firm which represents several U. S. manufacturers in the British Isles and in Europe. They represent the Concrete Pipe Machinery Company, the Besser Manufacturing Company, and the Lith-I-Bar Company. They plan to build several Haydite plants in England and possibly concrete block and joist plants. Waste shale from coal mines would be used as raw material for making Haydite. On their visit they traveled extensively among the concrete products plants in this country.

Cement Technician Opens Block Plant in Des Moines

Nate Trucano has announced the opening of his own block plant, the Central Concrete Products Company, in Des Moines, Ia. The plant, which has been completed and is in production, has a capacity of 800 standard blocks daily and is set up to produce fractional sizes of blocks. Mr. Trucano, though entering business for himself for the first time, is no stranger to the industry as he has spent the last twenty years as laboratory technician with various cement manufacturing plants. Some of the companies with which he has served are as follows: Hawkeye Portland Cement Company, Des Moines, Ia.; Calaveras Cement Company, San Francisco, Calif.; Peerless Cement Corporation, Detroit, Mich.; Aetna Cement Company, Bay City, Mich.; and Penn-Dixie Cement Corporation, Des Moines, Ia.



These charts show growing demand for concrete products in building industry.

Canada's Concrete Output For 1944 Hits $6,558,463

According to a report published by authority of the Hon. James A. MacKinnon, M. P., Minister of Trade and Commerce, production of concrete products in Canada during 1944 was valued at $6,558,463, as compared with $5,639,260 in 1943. A total of 149 plants were in operation throughout the Dominion. Ontario's 78 plants accounted for 44 per cent. of the total production, and the 40 in Quebec for 38 per cent. The remainder of the output was furnished by firms scattered through British Columbia, Alberta, Saskatchewan, Manitoba, New Brunswick and Nova Scotia.

Products included ready-mixed concrete, total valuation, $2,685,990; concrete pipe, $988,227; hollow concrete building block, $1,110,770; cinder block, $250,411; and other items, such as artificial stone, concrete brick, and Haydite block.

The following table presents statistics on the concrete industry in Canada from 1934 to 1944:

Year	No. of Plants	Average No. of Workers	Gross Selling Value of Products
1934	88	489	$1,042,258
1935	94	519	1,154,138
1936	97	602	1,713,347
1937	109	840	3,299,331
1938	119	834	3,200,419
1939	122	951	3,716,692
1940	128	1,145	5,303,560
1941	122	1,222	6,070,677
1942	141	1,368	7,315,041
1943	140	1,222	5,639,260
1944	149	1,195	6,558,463

Purchase Eastern Estate For Veterans' Housing

McClosky Homes, Inc., has recently purchased the 265 acres constituting the remaining portion of "Whitemarsh Hall", the Stotesbury estate, located near Philadelphia. The site will be developed at once with 1,000 homes, representing a total investment of $10,000,000, to be sold to ex-service men. The McClosky organization which specializes in concrete construction and design, built the first self-propelled concrete cargo vessels which were used extensively in the war for the transport of material and supplies.

The all-masonry houses to be built on the Stotesbury tract, according to Matthew H. McClosky, Jr., head of the organization, will represent a revolutionary method in home construction, making it possible to build individual homes in large numbers at hitherto unknown speed. They are not to be confused with prefabricated dwellings, but are constructed individually at the site.

Problems to Be Considered By New N.C.M.A. Committee

The formation of a committee on manufacturing and technical problems has been announced by the National Concrete Masonry Association, with Jay C. Ehle of the Cleveland Builders Supply Company as chairman. Serving with Mr. Ehle are 23 members appointed by President Lynde.

An important function of the committee will be to confer with the director of engineering concerning the general plans and broad aspects of the association's technical activities. Special attention will be given to such matters as the development of technical data and improvements relating to the production and use of concrete products.

City Sanitary Department Buys Concrete Brick Maker

According to an announcement made recently by T. W. Clapham, manager of the Little Rock, Arkansas, sanitary sewer system, his department has ordered a concrete brick-making machine with a capacity of 4,000 bricks per day. Mr. Clapham stated that the equipment was purchased because of the shortage of bricks in Little Rock, where manufacturers reported that they were from five months to two years behind on orders.

New Plant Processes Cinders for Light-Weight Blocks

By HAROLD GEIST

View of cinder crushing plant as it is today. Truck, at right, is dumping raw cinders into hopper.

another P and Q exclusive

A UNIQUE experiment in crushing cinders for the manufacture of concrete blocks is being conducted at The Geist Coal & Supply Company plant in Cleveland.

The Geist plant has manufactured light-weight blocks almost exclusively for the past 8 years, using Haydite aggregate. Anticipating, however, the inevitable shortage of light-weight aggregates of all kinds, they decided several years ago to put themselves in a position to use another source of supply. Cinder blocks appeared to be the answer, but with the big question mark of customer acceptance attached.

The Cleveland market is conditioned to light-weight, light-colored blocks, and there had never been a consistent attempt to sell cinder blocks in that area. With the feeling that light-weight blocks alone will allow the block industry to maintain the gains it has made during the past few years, Geist did not consider for a moment a reversion to the heavy-weight block of the 1910 era. With weight then, as one of the prime requisites, they decided on cinder blocks with the determination that they would be of such quality that they would be acceptable to the choosy Cleveland buyers.

There were two major steps in establishing a cinder crushing plant. The source of supply was all important both to insure an adequate flow of raw material and to determine the type and size of cinders available. It was felt important to determine, at least to a degree, the condition of the cinders available. Were they large, hard clinker or softer, smaller, friable material? Would there be an amount of uncured cinders, perhaps hot from the boilers, or would they be well cured? Would they be wet or dry? What would be the percentages of ferrous particles and tramp iron? Would they be clean or full of rubbish?

The second major step was to determine the best known methods of crushing cinders to size. President Herb Geist went on a surveying trip of several weeks, looking and asking questions at plants where cinders were being processed, and following every lead and suggestion.

The main apparent difficulty with most cinder processing plants appeared to be severely-high maintenance costs and not too high production records, both because of capacity and time out of service for repairs.

These two factors appeared, in many cases, to go hand in hand. A small capacity crusher, no matter of what type, would not produce satisfactorily under a constant overload of highly-abrasive cinders without considerable repairs. It appeared then that a major requisite was to have the grinding equipment of such capacity that it would handle the heaviest necessary demands upon it without breaking down.

From the observation of several block plants crushing their cinders by means of a dry-pan and the apparent success with which they were

Left: Part of the yard and plant showing the conveyor which carries aggregates to the overhead bins. Bins are housed in the highest section of the building with the mixer floor directly below. The conveyor is 258 feet long, powered by 15-hp. motor with gear reducer. Right: Discharge end of crushing plant. The vibrating screens may be seen at right, mounted over a chute which allows the screenings to drop onto the belts which carry them to the stockpile.

handling large cinder tonnages, it was felt that this method offered many possibilities, and preliminary plans were made to develop ideas along this line.

Through a long acquaintance with brick manufacturing, Herb Geist had more than a passing knowledge of dry pans, their capacities and their weaknesses. Both from prior experience and from current observation the dry-pan had a fault which seriously reduced its value in handling cinders. The clogging of the screen plates either made necessary the enlarging of the holes in the plates to the point where they were useless in sizing the cinders, or if the holes were left the proper size, clogging cut down the output to a serious degree.

A dry-pan grinder appeared to be the happy answer. The grinder differs from the dry-pan in that it has solid instead of perforated or slotted bed plates. In the dry-pan the material drops through these perforations when it is down to size. In the grinder, with solid bed plates, the material is discharged by centrifugal force between the bed plates and a fixed ring around the perimeter of the grinder bed. This creates a continuous slot which can be adjusted to a half-inch or less, and it was felt that the clogging problem would not be nearly as serious as with the dry-pan with its hundreds of smaller perforations.

This exact type of equipment was available, second hand, and a nine-foot heavy-duty Bonnot dry-pan converted to a grinder was purchased.

The installation was made on a poured concrete base, with the bed of the machine about 4 feet off the ground. From an under-track car unloader a conveyor belt with a magnetic pulley at its head was installed to discharge directly into the grinder, and a second conveyor belt was installed under the discharge opening in the grinder base to carry the crushed cinders to the stockpile.

This installation proved successful only to a degree, with the fault of not grading the finished product sufficiently to make a well-textured block. The reason for this fault was the continuous side slot through which the crushed cinders were discharged. The slot could easily be adjusted to keep the size of the crushed product to a half-inch in thickness, the desired top size, but it did not prevent the passage of flat pieces, which in some instances might be as large as three inches in diameter, from sliding through the slot. It was felt too, that capacity could be increased considerably by removal of the fines before they passed through the grinder. The answer was, of course, a screening operation, and after some months of crushing the plant was redesigned to incorporate two Leahy vibrating screens mounted in tandem.

Crushed cinders are stockpiled for as long as possible for curing, then they are picked up by a bucket loader and carried by truck to the block plant.

Because of the location of the grinder in relation to the railroad siding and unloading pit it was impossible to mount the screens between the grinder and the unloader and the installation was made by going past the grinder and returning to it. From the car unloader a long conveyor was installed, inclined at about a 20 deg. pitch and passing beyond the grinder. This conveyor, Number 1, with a Ding's magnetic separator head pulley to remove ferrous particles and tramp iron, discharged onto the vibrating screens. The fines passing through these screens dropped onto a belt which carried them to the stockpile. The coarser particles dropped in turn onto belt Number 2 which carried them to the grinder for crushing, from which they dropped onto belt Number 3 which discharged directly onto belt Number 1 again, where they started the cycle over again. The operation is thus a closed circuit with no chance of oversize pieces being carried to the finished stockpile.

This arrangement has proven satisfactory with the exception of some details in design which were not foreseen, and which are interesting in themselves. The screening out of the fines before passing into the grinder has reduced considerably the tonnage passing into the grinder itself, putting it below the full efficiency level it reaches when grinding at full capacity. It has been found necessary to change the gear speeds on the conveyor belts which feed the grinder in order to increase the flow of materials into it. This should increase considerably its present production rate, which is the grinding and sizing of about one ton of cinders per minute.

It will not, of course, average the crushing speed since it has proven impossible to make that much material available constantly throughout the day. The present method allows the unloading of hopper cars and trucks, but the placing of cars and frequent unavoidable delays in trucking does not allow a constant flow of material. The average hopper car is unloaded and crushed in an average time of about one hour and 10 minutes after it has been placed, which allows time to move the second hopper over the unloading pit. The contents of the average-sized dump truck are crushed in about 5 minutes.

Both in output and in maintenance the principle of this crushing method has proven completely satisfactory. Since its installation in 1944 it has ground thousands of tons of cinders, and much of the comparatively short time it has been out of service has been for redesigning and rebuilding the conveyor system rather than for any fault of the equipment itself. Repairs to the grinder have been few. Two new sets of cast-iron bed plates and the re-facing of the muller wheels with Stoody self-hardening metal have been the only major repairs. The original surfaces of the grinding wheels lasted through almost two years and at the present apparent rate of wear on the new surfaces they should last for many months, even at the present grinding rate of 300 to 400 tons daily.

Cinders are stockpiled for as long as possible. The ideal is, of course, for a stockpile of crushed cinders sufficiently large to allow perhaps a 90-day curing period in the weather, but the present supply of raw cinders is so uncertain that it has been found impossible to approach this figure.

Arrangements are at present being made to spray the crushed cinders with water or lime water to hasten the curing and leaching process. Shortage of piping and other necessary supplies has made this impossible up to this time. The Geists feel they are fortunate in having available the type of cinders they now use which cause no serious difficulty in staining or popping. It is desirable, however, to use the spraying method recommended by the Portland Cement Association to reduce to a minimum the possibility of chemical reaction in the finished block.

(*Continued on Page* 161)

Conserco's Peacetime Operations Reflect Experience Gained During War

another ON THE SPOT report

STRANGE as it may sound, a large fleet of ready mix concrete trucks is owned by an organization that has never sold a single cubic yard of concrete.

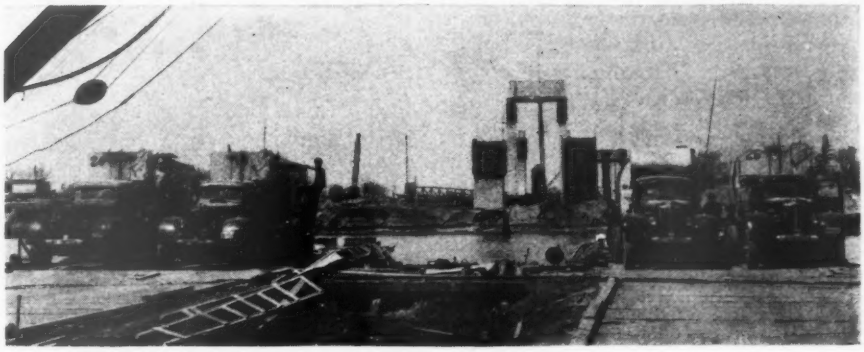
This organization operated as Conserco, Inc., from 1939 until recently when a new corporation, Conserco Company, was formed by the operating personnel of the former concern. This new company is continuing to do business in the same progressive manner, having purchased certain assets, rights, etc., from Conserco, Inc.

By WILLIAM M. AVERY

Conserco, Inc., was originated for the purpose of making supplementary rental equipment available to ready-mixed concrete producers whose own facilities were inadequate for handling current orders. This unique service gained a ready acceptance among producers who found themselves constantly faced by the dilemma of whether to buy additional equipment to handle a sudden flush of orders or to play safe by trying to get along with what they had.

During the war period practically all the concrete poured by Conserco mixers went into large government construction projects, and in many cases all the concrete used on large jobs was mixed and delivered in Conserco equipment. In some cases all the ready-mixed concrete producer's own equipment was engaged in other important work, and only because of the availability of rental equipment was he able to bid.

A part of Conserco's large fleet of truck mixers lined up in the company's yard at Washington, D. C.



Four units of the Conserco Company's fleet shown in the midst of pouring operations for the St. George bridge across the canal at St. George, Delaware.

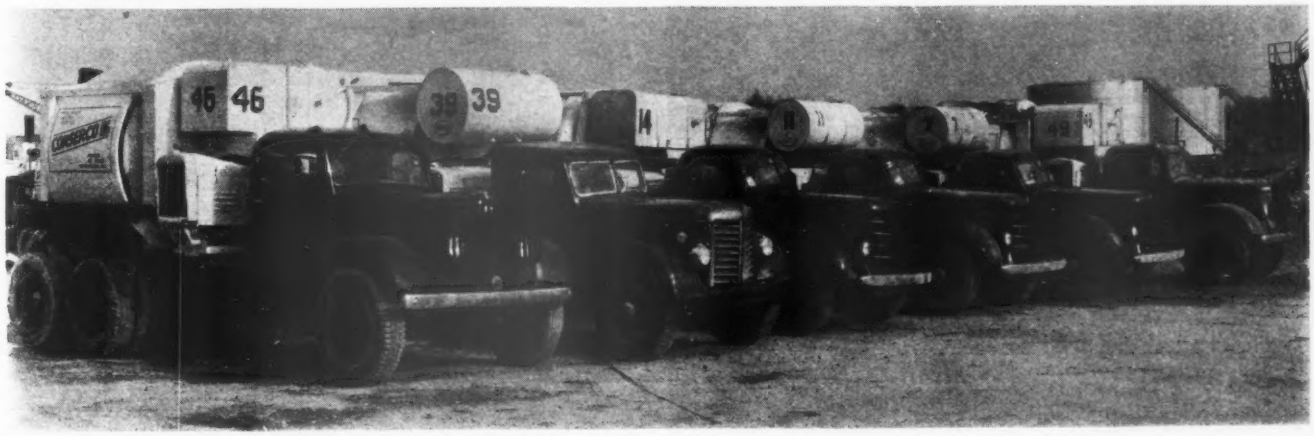
Conserco trucks delivered concrete for 7 military cantonments, 6 ordnance plants and storage depots, 2 shipyards, 3 naval supply depots, 2 air ports, atomic bomb plant, and a large aircraft assembly plant, the last named alone involving 200,000 cubic yards of material, many warehouses, plants, etc., during the war construction program. All these projects were out-of-town jobs, and they were handled in addition to a large volume of work on government buildings, warehouses, bridges, roads and housing projects in the Metropolitan Area of the District of Columbia.

More than 800,000 cubic yards of concrete was poured by the company's fleet in a period of 12 months during the peak of war construction. The 61 truck-mixers in service, on jobs where the yardage figure was available, delivered an average of 50 cubic yards of concrete per truck per working day. This large volume is explained in part by the fact that most of the material was hauled from bins located on the job site.

The company's trucks made a continuous underwater pour of 3,200 cubic yards of concrete in 29 hours during the construction of the bridge across the canal at St. George, Delaware. On another project a pour of 1,770 cubic yards was made in 19 hours with 24 trucks, hauling through the dense traffic of the capitol.

Normally the lessee of Conserco trucks supplies his own drivers and furnishes gasoline, oil and maintenance for the equipment, but during the war emergency the company was forced to do the entire job. Ready-mixed-concrete producers who needed supplementary equipment were almost invariably shorthanded and lacked both the facilities and the time to service the trucks. Conserco trucks have operated in every state along the Atlantic seaboard, and on large projects in West Virginia, Ohio, Tennessee, Michigan, Wisconsin, Indiana, Mississippi and Arkansas. The company's fleet during the war years reached the maximum of 80 3-, 4- and 5-cubic yard truck mixers.

The logistics problems entailed in the operation of so large a fleet over the entire eastern half of the United



States are of considerable magnitude. On remote jobs it was found necessary to establish offices, maintenance and repair shops and timekeepers on the site in order to keep the equipment operating at peak efficiency. Due to the long distances over which trucks were moved under all sorts of unfavorable conditions, repair and maintenance costs were relatively high.

These experiences under the necessities of the war emergency have convinced the company that it is uneconomical to base its entire fleet in Washington if its operations are to continue on a nationwide basis.

Under consideration now is a plan to establish distributing agencies throughout the United States, and ultimately, perhaps, in Central and South America, apportioning the fleet in accordance with the volume of business in the various areas. Such an arrangement would obviously effect a sharp reduction in the amount of cross-country movement now necessary, and would improve and expedite service immeasurably. Each agency would, for all practical purposes, be a completely self-contained organization, with full-time personnel, and repair and garaging facilities for its fleet. When unusual demands are made on one agency in excess of its capacity, it could borrow additional trucks from a neighboring agency until the emergency had passed, in this way speeding up customer service and maintaining the maximum number of units of the total fleet in production.

With nationwide operations, Conserco expects that the fleet will have to include a wider range of mixer capacities than has heretofore been necessary. Most of the trucks will be of the high-discharge type, but there will probably be some low-discharge machines among those of two-cubic-yard capacity.

A Conserco night crew begins pouring 1,000 yards on a bridge construction project.

One of the outstanding advantages of the service to ready-mixed-concrete producers is that rental payments may be charged in a single year to operating expense in the determination of income-tax liability. New trucks are generally considered to have a useful life of 5 years, and mixers 5 or 6 years, so that in the purchase of truck mixers the owner is required to write off the capital investment over a period of several years. The difference in tax liability can be important enough in some instances to discourage the prospective purchaser, particularly when there is a lack of assurance that the new equipment can be kept in reasonably-continuous production.

Under the proposed nationwide distribution system, Conserco's home office will continue to be in the Washington area, where the principal garage and repair facilities are now maintained.

The officers of Conserco Co. are J. Maury Dove, Jr., president; Clifford F. Johncox, vice-president and treasurer; F. A. Gardner Dove, secretary. These men have been associated with the equipment rental business since 1940.

Concrete Wartime Ships Considered Satisfactory

A report recently made by the maritime commission revealed that 104 concrete ships had been built for the Navy during World War II—80 barges and 24 powered vessels—at Savannah, Georgia, National City, California, and Tampa, Florida. S. D. Schell, executive director of the commission, told members of the House Appropriations Committee during hearings on the 1947 Navy appropriations that the concrete ships had had a good record.

Below: Construction work on an ordnance plant in Ohio. Right: A Conserco municipal construction job in progress.

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MANY Ready Mix Plant customers ask for 'Incor' 24-Hour Cement for heavy-duty concrete . . . floors, loading platforms, wherever durability, wear resistance and watertightness are essential. That's because—in addition to a good concrete, properly placed—THOROUGH CURING is positively necessary. But thorough curing means keeping ordinary concrete wet 6 to 8 days—next to impossible under job conditions. And that's why the builder asks for 'Incor' —because 'Incor' cures THOROUGHLY in 24 to 48 hours, saving 5 to 7 days. This also means that floors can be resurfaced economically over a week-end, avoiding plant tie-up. Heavy-duty concrete—quicker, surer—*another good reason why* leading Ready Mix Operators make 'Incor', America's FIRST high early strength Portland cement, available at all times, as part of their good service.

LONE STAR CEMENTS COVER EVERY CONSTRUCTION NEED

Heavy-duty floor built with 'Incor' at Dr. Pepper Bottling Works, Springfield, Mo., shown in photos, above. Contractor, H. H. Stephens; Ready Mix 'Incor' Concrete from Garrett Const. Co., both of Springfield, Mo.* *Reg. U. S. Pat. Off.

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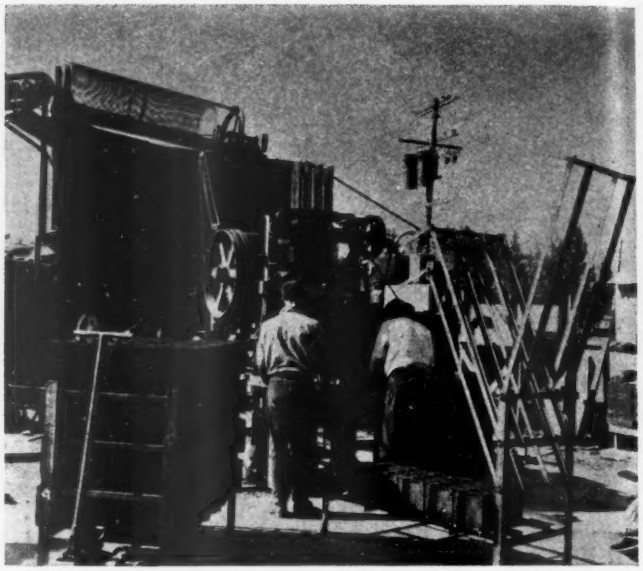
Lava Cinders Yield Ideal Material for Deschutes Concrete Plant

By HARRY F. UTLEY



Above, left to right: Keith Parkinson, superintendent, and Chester Lackey, owner of the Deschutes Concrete Products Co., Redmond, Ore. Right: The block machine, a full rack at left and a rack being loaded at right, showing hinged decks swung up and out of the way. In background, bin and revolving screen.

another ON THE SPOT report

EAST of the Cascades Mountains in Oregon are vast beds of lava, the result of prehistoric volcanic upheavals. Many of these beds contain huge deposits of volcanic cinders which, in appearance and structure, are not unlike industrial cinders that are the by-product of combustion of coal in steam plants. Such volcanic cinders have been found to be an excellent lightweight aggregate for concrete and they are being so utilized in a new and modern concrete-products plant erected by Chester T. Lackey in Redmond, Oregon.

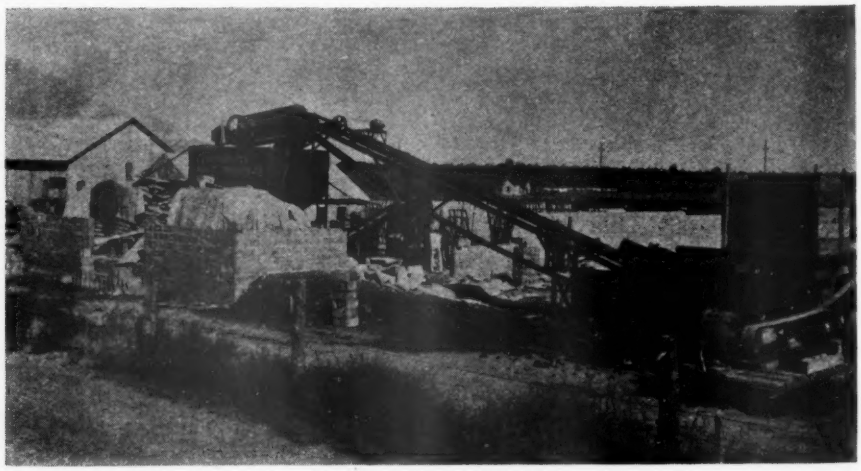
The concern, known as the Deschutes Concrete Products Company, began production in the summer of 1945 as soon as the machinery was set up, and the building to house the equipment was erected later.

The cinders are obtained from a bed on Tethrow Butte, about 5 miles from Redmond. They are loosened and broken into chunks by a Caterpillar tractor and bull-dozer and loaded into dump trucks by a Scoopmobile. They are stockpiled at the plant, being recovered by the same Scoopmobile which works in the deposit, the loader carrying a bucketful up a ramp and discharging into the 24-inch Symons horizontal disk crusher with its plates set to produce an aggregate, the maximum size of which is 3/8 inch. A 20-inch belt-conveyor, 58 feet on centers and equipped with Hewitt rubber belting, carries the cinders up to a trommel set above a two-compartment, 25-cubic yard steel storage bin. The 3/16-inch openings in the trommel mesh separate the coarse and fine cinders which drop into their proper bin compartments.

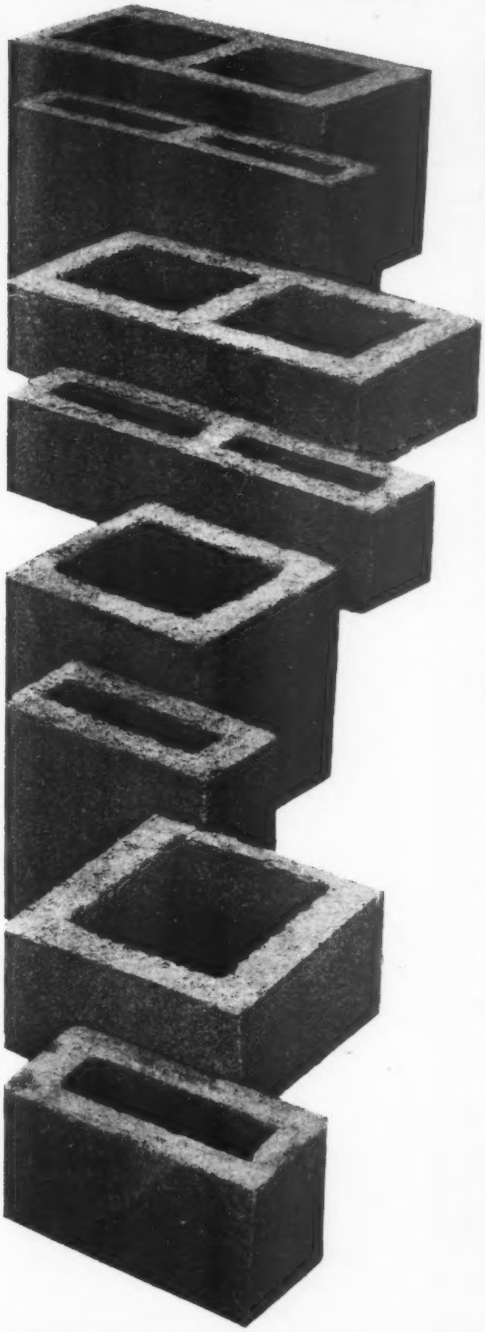
Hand-controlled gates in the sloping bin bottoms feed the cinders into volumetric measuring boxes and the batch is discharged directly into a 12-cubic foot Stearns mixer immediately below in the proportions of 45 per cent. coarse and 55 per cent. fine aggregate. Some natural sand is added to improve workability at the time the cement is dumped into the mixer from paper bags. Calcium chloride is regularly employed as an admixture, 100 pounds of the flake being dissolved in 35 gallons of water to make up a supply. One gallon of this solution goes into each batch of concrete.

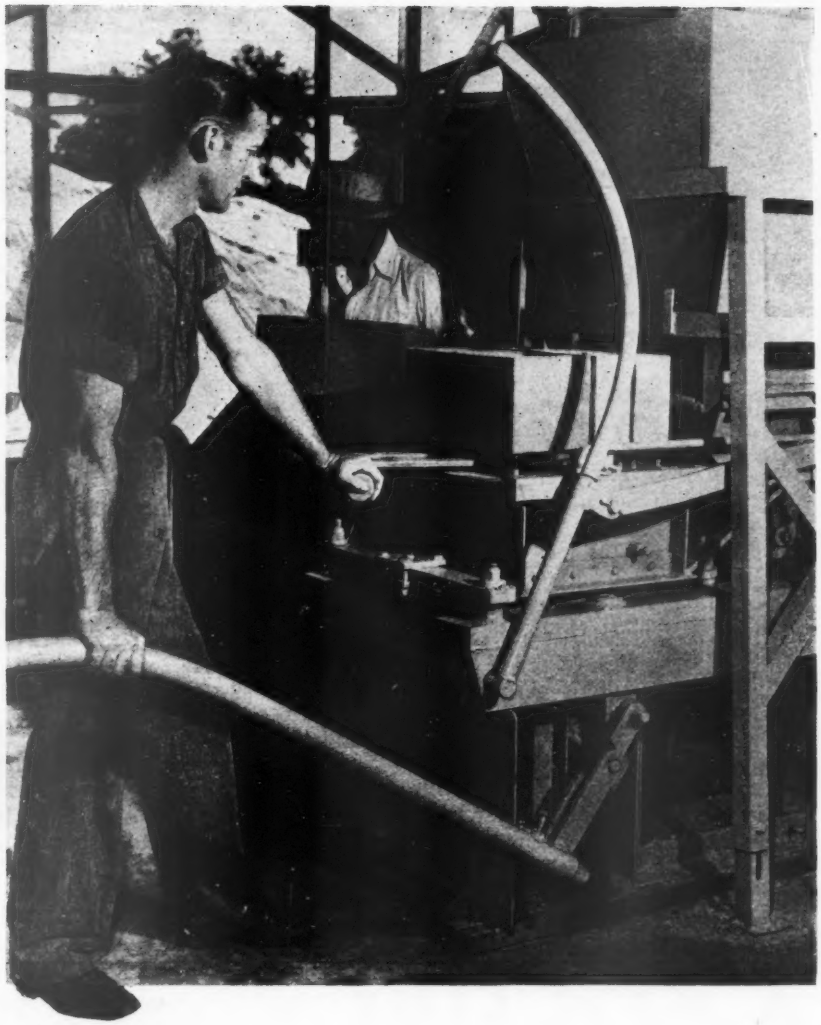
A short, inclined belt conveyor feeds the concrete into the hopper of the new Stearns Clipper stripper which molds the units, the regulation 8- by 8- by 16-inch block being standard in this area. A yield of 20 units per sack of cement results, the blocks testing uniformly about 1,900 p.s.i. Samples are regularly broken in the testing machines at Oregon State College. Units are borne off at the Clipper and loaded onto special hinged-deck steel racks which

General view of the Deschutes plant, with the walls under construction. Cinder crusher at right.



Versatility Plus means more profit from your CONCRETE BLOCK MACHINES





STEP UP PRODUCTION

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Versatility, plus greater production, means greater profits to you. One unit only will produce for you 1600 blocks or more in an 8-hour day; a two machine unit operating from one mixer and conveyor will produce for you over 3200 blocks a day.

Modern assembly line production methods, plus exclusive Graveley patents, produce for you a better machine at a lower investment.

Immediate delivery is now possible. Write, wire or phone today. Put a Graveley to work for you without delay.

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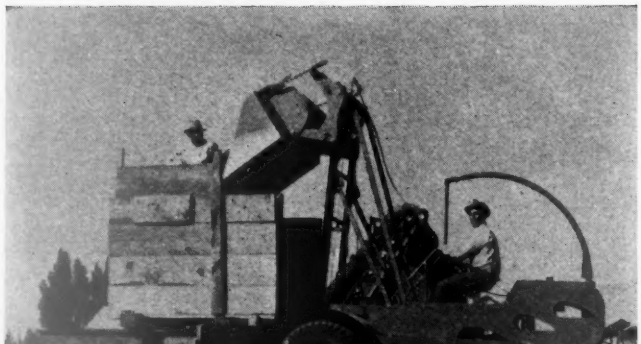
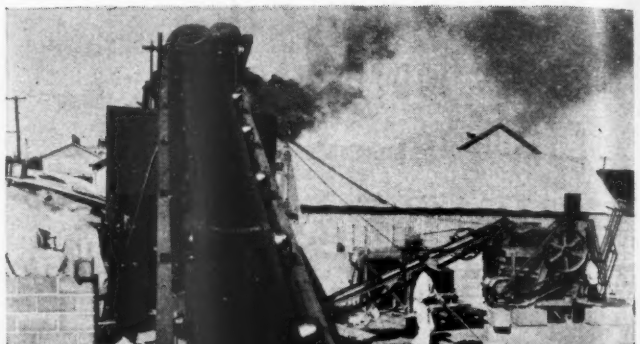




Above: The mobile loader discharging a load of cinders from the crusher to the trommel over the steel storage bin. Right: Looking up the belt conveyor which carries crushed cinders to the trommel.

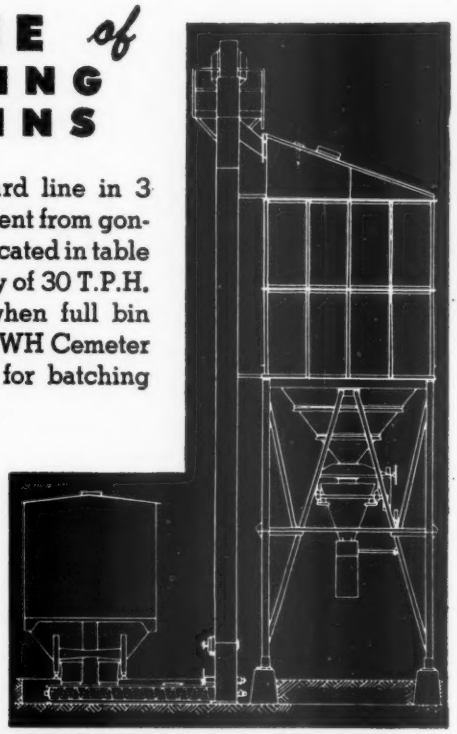
were fabricated by welding by the company. Each rack holds 48 of the 8-inch units. During the summer months the blocks were cured in the open with the benefit of frequent sprinkling but this winter all are to be steam-cured in three curing rooms which were under construction at the time the plant was visited in September, 1945. The boiler is fired by an automatic stoker burning domestic coals. A Yale & Towne hand-operated lift-truck moves the loaded racks into the curing rooms and the versatile Scoopmobile, stripped of its bucket and with lifting forks inserted in its stead, removes the cured units to the storage yard and loads them onto flat-bed trucks for delivery.

The plant structure which was under construction last September, when the plant was visited, is 32- by 100-feet in ground area and of concrete-masonry construction. The roof over the curing rooms will be insulated with a deep layer of cinders. The plant floor and yard runways are paved with concrete. Besides molding the standard 8-inch units and specials in this size, the Clipper turns out 4-inch partition blocks and molds are on hand for producing bricks.

Deliveries are made within a 25-mile radius, including the city of Bend. The flat-bed trucks being used

A NEW LINE of CAR LOADING CEMENT BINS

WE have developed this standard line in 3 popular sizes for hauling bulk cement from gondola cars to bin. Capacities are indicated in table below. Bucket elevator has capacity of 30 T.P.H. High level bin signal indicates when full bin capacity has been reached. Type DWH Cemeter provides 8 to 20 cu. ft. capacity for batching service. *Write for complete data.*



BIN	CAPACITY	
	CU. YDS.	BBLS
1	29	172 to 194
2	45	270 to 304
3	73	437 to 492

ERIE AGGREMETER PLANTS

Erie Steel Construction Co., 669 Geist Rd., Erie, Pa.

BUCKETS • AGGREMETERS • PORTABLE CONCRETE PLANTS

THE SALSBURY TURRETEER

RELIEVES 3 TO 5 MEN

- One Turreteer will do work of 4 to 6 men—quickly pays for itself.
- One truck will handle output of two blockmaking machines.
- The Turreteer is unusually fast (up to 8 m.p.h.), maneuverable, rugged, stable.
- Power plant and drive wheel are a single unit. Turret revolves to change direction.
- Articulation smoothes out the bumps.
- Four wheels under load at all times.
- Capacity: 4000 lb. load plus driver. Will negotiate steep ramps.

Write for Bulletin TTB-1

SALSBURY MOTORS, INC.

1201 LEXINGTON, POMONA, CALIFORNIA

A subsidiary of Northrop Aircraft, Inc.

for making deliveries will be augmented by the addition of an International semi-trailer combination capable of transporting 1,000 units per trip. Keith Parkinson is the plant superintendent.

A Tuerck-McKenzie pipe machine is expected to be installed at an early date as the company anticipates a large demand for pipe for irrigation purposes. Within a very short time, 55,000 acres of land near Redmond will be opened to cultivation, all to be irrigated by the North Unit of the Deschutes Project now under construction by the U. S. Bureau of Reclamation in the Madras-Culver area. Dams in the Deschutes River will provide the water. Two more curing rooms are to be added as soon as pipe production gets under way.

Mr. Lackey, owner of the new venture, has for many years been engaged in the production of aggregates in the Redmond area, his sand-and-gravel plant on Crooked River, 14 miles from Redmond, having supplied the needs of the Bureau of Reclamation on the irrigation project. The plant has a daily capaccity of 600 tons of washed and screened aggregates. Ready-mixed concrete is also produced.

Cinder Preparation

(*from page* 154)

From the stockpile the cinders are picked up by a Barber-Greene bucket loader and taken by truck to the block plant proper, which is about 800 feet from the crushing operation. It has not been possible, up to the present, to evolve a conveying method from stockpile to plant more satisfactory than trucking. Costs are not prohibitive, nor are they higher than other contemplated methods of getting the same job done.

At the plant end of the operation the cinders are handled the same as Haydite or any other aggregate. There is a 10-cubic-yard hopper, with its top at ground level, into which the trucks dump their loads. This hopper feeds, through a simple gate arrangement, a 258-foot-long conveyor belt which carries the product to the storage bins. Maximum elevation reached by the belt is about 55 feet, and it feeds directly, by chutes, into any one of the three storage bins which are at that level.

The Geists' crushing method differs considerably from the more widely used methods of preparing cinders. They insist that it is an experimental operation even yet, although it has prepared the cinders for their use for two and a half years with satisfactory results.

KENT-

a name identified with advanced CONCRETE PRODUCTS MACHINERY

• • •

Since 1925

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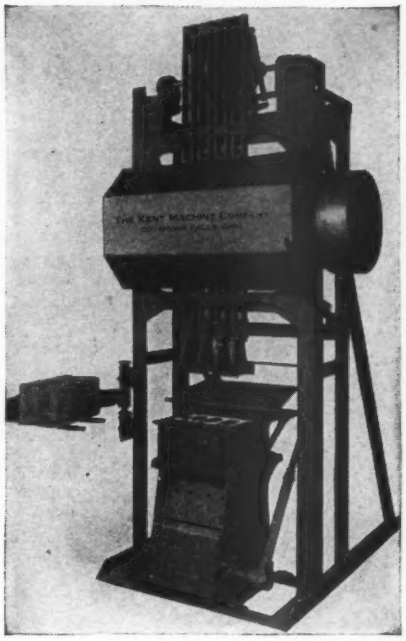


Write for literature describing the following products or complete plants for small or large volume production!

—KENT Tampers
—KENT Strippers
—KENT Feeders and Elevators
—KENT Batch Mixers
—KENT Continuous Mixers
—KENT Aggregate Elevators
—KENT Pallets and Pallet Dunkers
—KENT Steel Racks
—KENT Lift Trucks
—KENT Complete Plants

Free consultation is available regarding planning of new plants or modernizing of your present layout.

• • •

The KENT MACHINE Co.

115 East Portage Trail — Cuyahoga Falls, Ohio

Check these advantages of DAREX AEA

FOR READY MIX PLANTS:

1. DAREX AEA gives controlled air.
2. DAREX AEA improves plasticity which:
   a. Facilitates handling of concrete
   b. Reduces segregation of aggregates
   c. Minimizes bleeding
   d. Permits faster discharge of trucks at job
   e. Helps your customers speed finishing
3. DAREX AEA maintains the strength of concrete when cement factor is constant.
4. DAREX gives flexibility of operation. Operator need stock only one cement to make regular or air-entrained concretes.
5. DAREX gives positive savings.
6. DAREX is easy to use, and simple mechanical proportioning devices are available.

FOR CONCRETE PRODUCTS PLANTS

1. DAREX AEA improves production by reducing green breakage.
2. DAREX improves the appearance of the product.
3. DAREX improves water-proofing properties and reduces absorption.
4. DAREX increases strength.
5. DAREX reduces abrasive action on mold parts.

Darex AEA has already been used in over five million yards of concrete by hundreds of plants all over the country. Warehouse stocks of Darex AEA are available nationally through our distributors.

DEWEY AND ALMY CHEMICAL COMPANY

CAMBRIDGE · CHICAGO · OAKLAND

To get the most from air-entraining concrete—hold cement factor by redesigning mix—and use DAREX AEA.

NEW MACHINERY and SUPPLIES

● Hand-Truck

Concrete products manufacturers may now obtain a new hand truck, designed especially for handling palletized bags of cement. The Sackrete Company, Inc., of Cincinnati is responsible for the development and design of this truck, known as Twin-Tilt, which is manufac-

Two-in-one unit.

tured by the Twin-Tilt Truck Company, also of Cincinnati. The auxiliary frame of the Twin-Tilt is a feature which permits "picking" up a load of 1,000 pounds with a minimum of effort, as the tilting fulcrum is brought nearer the center of gravity of load, and at the same time aids in maintaining alignment of the stacked bags. Heavy, full welded con-

For moving palletized bags.

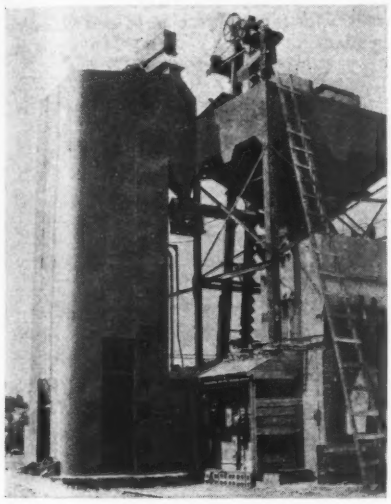
struction is used on the frame to eliminate bolts and rivets which may work loose or damage the load. A solid 1-inch

steel axle supports the 8- by 2½-inch molded-on rubber-tired wheels which are mounted on roller bearings.

The wooden skids used in conjunction with the Twin-Tilt are small, handling a single stack, thereby permitting operations in confined areas, reducing the effort required in stacking, and consuming a minimum of space when not in service.

• Batching Plant

Manually operated or fully automatic batching plants are presented to concrete products manufacturers by the Noble Company, of Oakland, California. The "Model CA-60" batching plant includes a 60-ton, 2-, 3- or 4-compartment aggregate bin and a 250-barrel cement silo which is mounted at ground level. The



Manually or automatically operated.

weighing batcher is of 1 cubic yard capacity. Double clamshell bin gates provide accurate cut-off, and a full vision indicator shows the approach to final weight from as much as 700 pounds under as each class of aggregate flows into the weigh hopper. The two-position batch gates, pneumatically operated, are automatically closed to the first or "dribble" position when the final weight is approached, and are cut off positively the instant the indicator signals final weight. Automatic beam scales, furnished with any desired number of poise beams, and electrically operated cement batching are also employed in this new plant.

• Steel Pallets

The Commercial Shearing and Stamping Co. of Youngstown, O., recently introduced a new line of cored steel pallets, to be known as the "Modular Type." They are designed for making blocks 15⅝ inches long; thus, when they are used with ⅜-inch mortar joints, the blocks will lay up on 16-inch centers.

Modular Type is made of cold pressed steel, with mortar grooves and strength-imparting ridges in the cross ribs. It makes an important addition to the styles and sizes already manufactured by Commercial.

A 350 Ton Merry-Go-Round!

As one of the nation's largest producers of concrete building blocks, The Geist Coal and Supply Company, Cleveland, Ohio, was among the first to face the demand for increased production to meet urgent building requirements. Producing two million blocks during 1943, the company still had to turn down as many orders as it accepted. A critical shortage of full-time, experienced help and the lack of additional production machinery stymied efforts to increase production.

Seeking a solution to the problem, Geist devised a plan for operating 24 hours a day, using part-time labor and depending upon a modern Towmotor handling system to maintain an uninterrupted flow of production. Today, Geist production figures are among the three or four highest in the country, its daily output of 25,000 blocks — an increase of 400% over the 1943 figure—represents the maximum machine capacity.

Towmotors on this operation transport 350 tons of blocks per day from block-making machines to curing rooms and to stockpiles and shipping. At this point, empty racks and steel loading plates are picked up and returned to the machines, where the cycle begins anew.

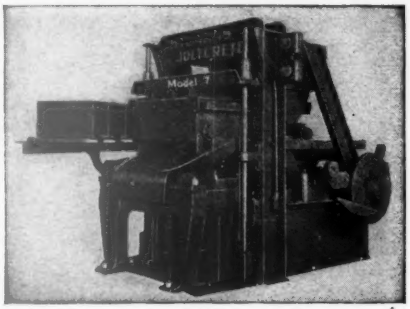
For every handling problem there is an engineered solution . . . a solution based upon Towmotor experience and "know-how" gained in solving handling problems in every industry. Send for your copy of the Towmotor Lift Truck ANALYSIS GUIDE today. Towmotor Corporation, 1228 East 152nd Street, Cleveland 10, Ohio.

TAKE IT UP WITH

TOWMOTOR

THE ONE-MAN-GANG

The Vibration Machine Supreme



Vibration under pressure — 7,200 blows per minute—and ruggedly built to give long life, the Joltcrete machine is the choice of the wise concrete-products operator. Produces clean-cut, high strength units in any size, and gets the most out of a bag of cement. Built in three sizes with capacities of 7 to 9 standard units per minute.

Stearns Clipper Stripper Machines; Stearns Joltcrete Machines; Stearns Mixers; Cast iron and Press Steel pallets. Straublox oscillating Attachments, etc. Repair parts for: Anchor, Stearns, Blystone Mixers and many others.

ANCHOR CONCRETE MACHINERY CO.
G. M. Friel, Manager — Columbus, Ohio

"NO KID GLOVE HANDLING"

Commercial Cored Pallets can be dropped, walked on, stored in wet places, stored in dry places, and nothing happens.

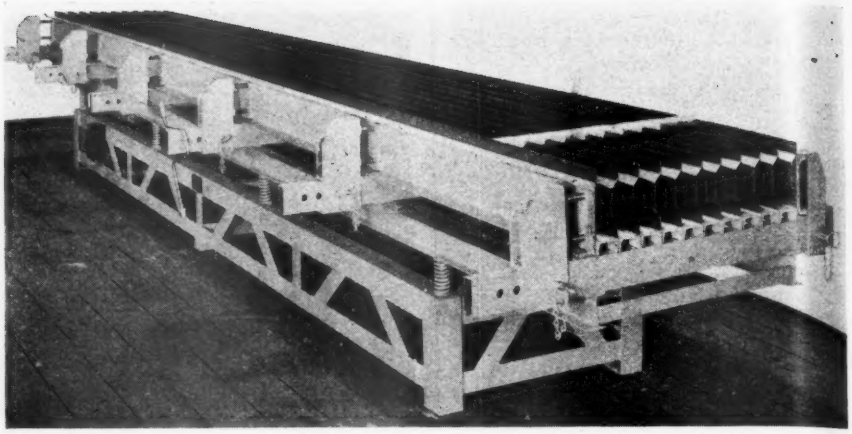
Treat any other kinds of pallets that way and see the results.

Commercial Cored Pallets need no kid glove handling in order to keep them in perfect shape for use at any and all times, and besides that they fit the core box; no filing, no grinding, no planing or sawing. When they reach you from our Plant they are ready to go right into the machine.

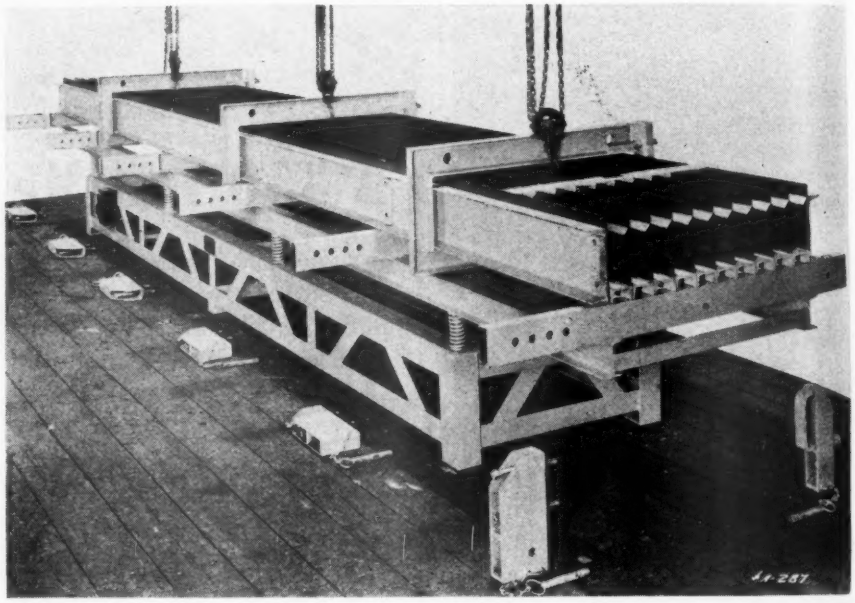
Why waste time and money on other types?

Write for our little folder, "Here's the Dope"

THE COMMERCIAL SHEARING AND STAMPING CO.
YOUNGSTOWN, OHIO



Two views of the Type "S" heavy-duty vibrating table, made by the Kirk & Blum Manufacturing Co., Cincinnati, which permits multi-production. Above: the table, ready for pouring ten joists, with steel cores and channel side members in place. Below: Special yoke frames attached for lifting the entire unit of ten joists for drying. Additional channel pallets, side channel members and steel cores are required; but the equipment eliminates the necessity of purchasing complete units as the same supporting rack, with removable clamps and vibrating mechanism, may be used with extra accessories needed for meeting production demands.



● Mobile Mixer

A new Rex "3½S" end-discharge tilting mixer has been announced by the Chain Belt Company of Milwaukee.

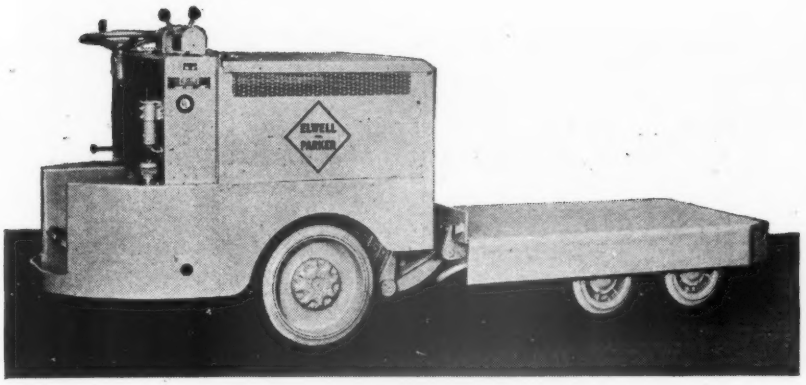
End-discharge, tilting mixer.

Features claimed for this new mixer are: an enclosed roller-chain motor-drum drive, an all-welded pressed-steel drum bowl, an easily-replaced ring gear which drives the drum, and a 24-inch control handwheel equipped with a ratchet-type lock.

A low center of gravity is obtained by cradling the mixer body between the wheels, which have a 62-inch tread. The Rex 3½S weighs 150 pounds less than the former side-discharge model and is equipped with cantilever springs and a removable tow pole.

● Power Truck

The Elwell-Parker Electric Company of Cleveland, Ohio, offers to industry its war-time-developed, power truck which is capable of transporting 10-ton loads. Powered by batteries and electric motors, these units are claimed to provide instant responsiveness. Ease in maneuvering, smooth, quiet operation, safety and economy also are stressed. The body of the truck is low, permitting complete visibility of platform, load and surroundings. The overall length is 147 inches, the width 45 inches. All six wheels are used in steering; the four wheels under the



Electrically operated power truck handles 10-ton load.

platform are said to insure stability of the load. The manufacturer claims that a complete turn can be made in aisles 71-inches wide. The truck has a maximum speed of 6 miles per hour and can be brought to a dead stop within a few feet.

Wide interest has been shown in the new film "Concrete Facts," which tells the story of cement dispersion, an outstanding development that improves all concrete properties and opens the way to lower construction and maintenance costs. The film explains the action and benefits of cement dispersion and air-entrainment and shows how the durability of concrete can be increased as much as 500 per cent.

High lights in the film are the results of studies of cement dispersion conducted by Ohio State University.

Leonard Fisher, of Mohall, N. D., who has been producing concrete blocks for many years, recently put into operation a new block machine which he built himself. The new machine produces two blocks simultaneously, turning out 220 blocks per hour. Mr. Fisher operates his own gravel pit and is now planning for the expansion of his kiln space to take care of his increased block production.

Near the Oklahoma border at Fort Smith, Arkansas, the Arkhola Sand & Gravel Company has erected a $100,000 concrete products plant which will turn out 5,000 units per day.

For Improvement in

Quality • Sales • Profits

Install [SCI]Z PRECISION CONCRETE CONTROL **It Includes**

Moisture Meter

Makes a test for moisture content of fine or coarse aggregates in ONE minute. Accurate to ¼%.

Compensator

Delivers correct DRY weight of wet aggregates and ADDED water. Makes a graph record of EVERY BATCH.

[SCI]Z **CONTROL produces *uniform* concrete. Is always approved by concrete engineers. Has definite sales value. Write for our booklet "Profits in Concrete."**

SCIENTIFIC CONCRETE SERVICE CORP
724 Salem Avenue, Elizabeth 3, N. J.

WANTED

Model 15—1¾ yd. cap. Transport Mixer

HELLER STONE COMPANY
Bluffton, Ind.

WANTED

6000 4" Presteel pallets for Joltcrete No. 9 machine.

E. J. REES CAST STONE CO.
Box 225 **Dover, Ohio**

WANTED

10 S Jaeger Tilt Type Mixers.

AMERICAN WILBERT VAULT CORPORATION
Forest Park **Illinois**

FOR SALE

Concrete Pipe Molds complete. Sizes 6" to 54"—Excellent condition—immediate delivery.

FAULKNER CONCRETE PIPE CO.
Hattiesburg, Mississippi

FOR SALE

Stearns Skip Hoist Loader 42 cu. ft.; complete with independent motors.

COMAC BUILDERS' SUPPLY CORP.
186 Norman St. **Rochester, N. Y.**

FOR SALE

1—3 yd. Jaeger Hi-discharge concrete mixer mounted on a 1942 Studebaker 6 x 6 truck

1—2 yd. Rex (built in 1945) hi-discharge concrete mixer mounted on 1942 GMC 6 x 6 truck

1—1½ yd. Jaeger horizontal concrete mixer mounted on 1940 GMC truck

1—1½ yd. Rex horizontal concrete mixer mounted on 1940 stub nose Chevrolet truck

ADAMS CONSTRUCTION COMPANY
411-17 No. Main **Janesville, Wis.**

FOR SALE

900 steel 10" 40% air space pallets, and 1425 steel 12" 45% air space pallets. Good shape, ready for prompt delivery.

FREDERICK G. SMITH & COMPANY
Freeport, Illinois

FOR SALE

Anchor Power Stripper with Double Bar Attachment, and 8" and 12" Attachments; 1200—8" Pallets, 1800—12" Pallets. Kent Continuous Mixer.

Box No. 95, c/o Pit and Quarry Publications
538 So. Clark Street **Chicago 5, Ill.**

FOR SALE

Stearns Power Stripper with 4", 8" and 12" attachments.

Kent Mixer and Elevator.

Box No. 94, c/o Pit & Quarry Publications
538 So. Clark Street **Chicago 5, Illinois**

FOR SALE

600 USED DRIER CARS FOR BRICK OR BLOCK

These all steel cars are 3 ft. wide by 7 ft. long with steel rack ends. They are 24 gauge with 10" cast wheels. Triple decked these cars handle 50 block. Cars are in Chicago and available for immediate shipment. Are remarkable bargain at $25.00 per car. Minimum order ten cars.

Several thousand feet of 20, 30, 45, and 60 lb. rail available. Priced to sell.

Several tons of 8" channel heat resistant steel dryer car tops.

Also complete machinery of modern brick plant to be disposed of at once.

TOM CONNELLY
638 Harrison St. **Oak Park, Ill.**
Phone: Village 3668

BLOCK PLANT

For Sale

One Stearns Clipper Stripper, Palletts, Molds, Lift Trucks, Metal Racks, Besser 30 cu. ft. Mixer & Skip Hoist—All Brand New—To be sold as unit.

L. H. Gaynor
P. O. Box 1587 **Mobile 9, Ala.**

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Just off the press and packed with the complete story of the BLATT SYSTEM — "Block Plant of Tomorrow" — fully illustrated. It's yours for the asking.
KISSAM-BLATT "Controlled Oscillation" BLOCK MACHINE
Fast, Smooth, Dependable, Economical in operation and built to last a life-time; Produces 1000 to 1200 standard blocks per eight-hour day; 30-50% additional capacity if off-bearer is used.
MIXERS — CONVEYORS — FEED HOPPERS
WATER CONTROLS — LIFT TRUCKS — PALLETS
Designed for low up-keep, longer life, less operator attention and greater production capacity, the BLATT SYSTEM offers the very finest Block Plant Equipment available today.
IMMEDIATE DELIVERY ON ALL EQUIPMENT UPON 30% DEPOSIT
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for these FREE descriptive folders TODAY
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